Zootaxa 4433 (3): 401–433
http://www.mapress.com/j/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.4433.3.1
http://zoobank.org/urn:lsid:zoobank.org:pub:54CBC64A-325D-4B35-B5D2-5B6ECC6FE980

A review of the *Elachista subula* Parenti species complex (Lepidoptera, Elachistidae), with descriptions of nine new Palearctic species

LAURI KAILA[1,3] & KARI NUPPONEN[2]

[1]*Finnish Museum of Natural History, Zoology Unit, FI-00014 University of Helsinki. Finland. E-mail: lauri.kaila@helsinki.fi*
[2]*Merenneidontie 19 D, FI-02320 Espoo, Finland. E-mail: kari nupponen@kolumbus.fi*
[3]*Corresponding author*

Abstract

Taxonomy of the here established *Elachista subula* species complex is reviewed. This species complex is subordinate to the *E. dispilella* group *sensu* Kaila *et al.* (2015), in subgenus *Aphelosetia*. The *E. subula* species complex is exclusively Palearctic. Most of the currently recognized species occur in dry areas in Central Asia where they appear to form a significant part of the *Elachista* diversity. The constituent species are characterized by a phallus with bent and sharp-tipped apex, and the vesica with one weakly sclerotized plate-like cornutus that usually bears one blunt or spine-like tooth. Fourteen species are recognized, of which the following 9 are described as new: *E. ameteria* Kaila, **sp. nov.** (Type locality country Kazakhstan), *E. cisoria* Kaila, **sp. nov.** (Spain), *E. cultella* Kaila, **sp. nov.** (Mongolia), *E. drepanella* Kaila, **sp. nov.** (Russia: Tuva), *E. marusiki* Kaila, **sp. nov.** (Mongolia), *E. perona* Kaila, **sp. nov.** (Kyrgyzstan), *E. platamodes* Kaila, **sp. nov.** (Croatia), *E. scalpra* Kaila, **sp. nov.** (Turkey) and *E. spinipyra* Kaila, **sp. nov.** (Turkmenistan). Redescriptions are given to *E. mus* Parenti¸ *E. bimaculata* Parenti, *E. semnani* Parenti, *E. subula* Parenti and *E. acutella* Kaila.

Key words: *Aphelosetia*, *dispilella* group, Elachistinae, Gelechioidea, *subula* species complex, taxonomy

Introduction

The notoriously difficult taxonomy of the *Elachista dispilella s. l.* species group, consisting of externally uniform species in the subgenus *Aphelosetia* of *Elachista* (Gelechioidea, Elachistidae) has drawn close attention since the 1980s, leading to a gradually improved understanding of the unsettled and largely unexplored taxonomy and species richness of this mainly Palearctic group of species. The delineation of this probably monophyletic group was first proposed by Kaila (2007). In addition to isolated species descriptions, there are a number of recent taxonomic revisions and other treatments of wider focus on the taxonomy of subordinate species complexes (Traugott-Olsen 1988, 1990, 1992; Albrecht & Kaila 1997; Kaila 2015a, Kaila *et al.* 2015, Mutanen *et al*. 2015, Kaila & Nupponen 2017).

The *E. dispilella* group comprises species usually characterized by a white or pale yellowish forewing, either unicolorous or with two darker spots, or as is typical of species of the *E. dispunctella* complex, with an irregular scattering of dark grey or brown scales as the pattern on the forewing (Kaila 2015a). The genital characteristics to delineate the *E. dispilella* group are based on phylogenetic analyses by Kaila (1999) and Kaila & Sugisima (2011), and elaborated in detail by Kaila *et al.* (2015).

A number of species have not been included in any of the revisions cited above, in that they do not display traits that are considered to be diagnostic for the species complexes that were covered in those works. In this paper, species that are morphologically close to *Elachista subula* Parenti are treated. These species are characterized by the rounded uncus lobes, the phallus with sharp-tipped, usually bent apex, and the vesica with one weakly sclerotized plate-like cornutus that usually bears one blunt or spine-like tooth. This species complex differs from the *E. dispilella* species complex in particular by the rounded shape of the uncus lobes. The distolaterally produced shape of the uncus lobes characterizes the *E. dispilella* complex (Traugott-Olsen 1990; Kaila *et al.* 2015, Kaila & Nupponen 2017). The presence of a cornutus is the sole differentiating feature with respect to the *E. dispunctella*

Accepted by J-F. Landry: 11 May 2018; published: 13 Jun. 2018

species complex. The delineation of the *E. subula* species complex, as called below, seems somewhat artificial considering that only a single trait forms the distinguishing morphological basis of these species complexes (*cf.* Kaila 2015a). However, the pattern of a neighbor-joining phylogram based on DNA barcodes (unpublished) gives support for the monophyly of this complex. The interspecific barcode pattern of the species of the *E. subula* species complex is shown in Fig. 1. A majority of the constituent species are distributed in Central Asia where they form a significant part of the *Elachista* diversity. Two species are reported from Europe: *E. cisoria* Kaila, **sp. nov.** from Spain, and *E. platamodes* Kaila, **sp. nov.** from Croatia.

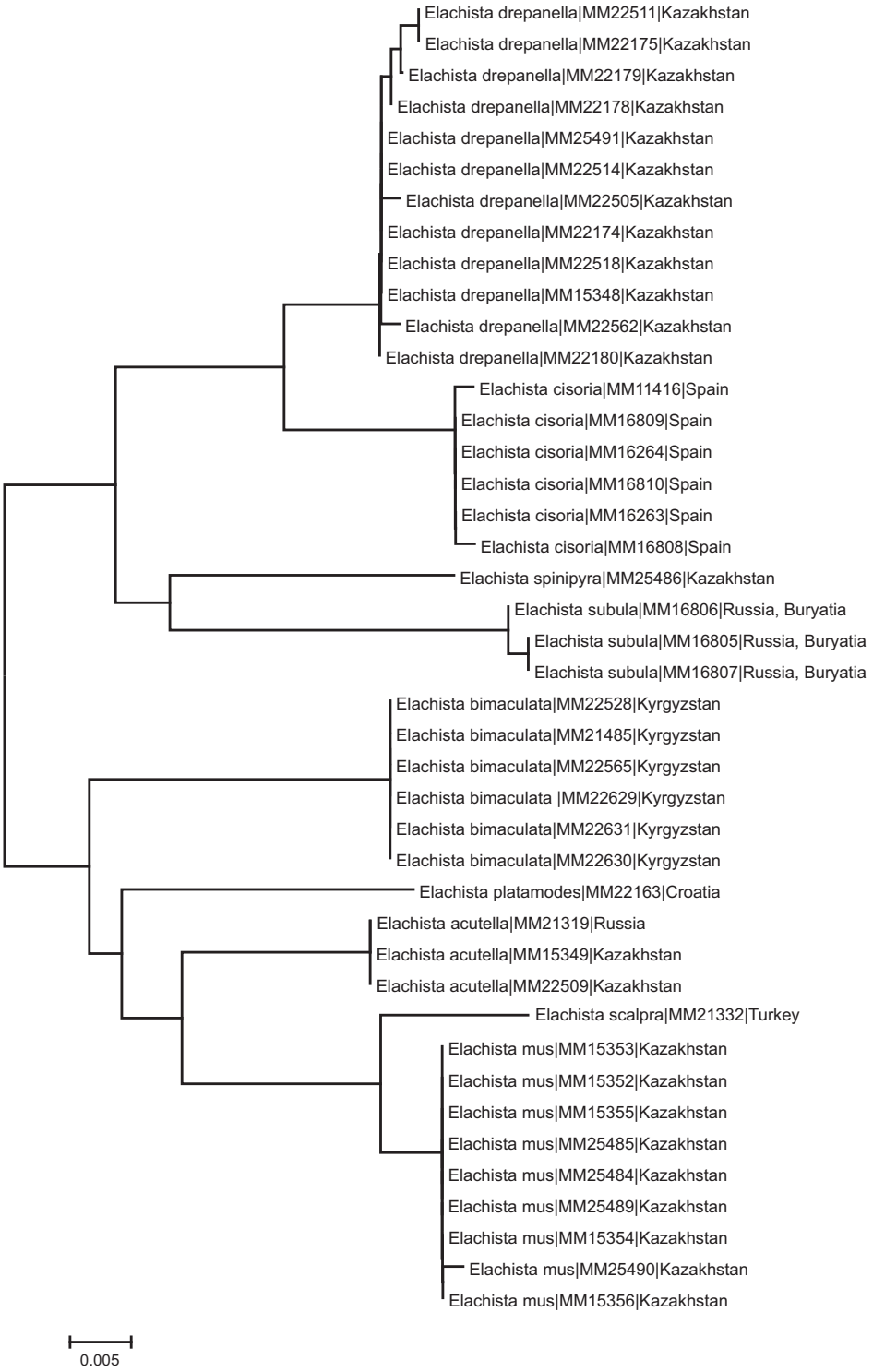


FIGURE 1. A Neighbor-joining tree, generated under the K2P nucleotide substitution model of 42 barcode sequences of specimens of the *E. subula* species complex.

In the present paper 14 species are recognized in the *E. subula* species complex. Of these, 9 are described as new. An identification key is given. Diagnoses and redescriptions are also given to the formerly described species, as most of the original descriptions are very brief, superficial and without notes on diagnostic characters. Furthermore, the illustrations are usually sketchy, causing difficulties in their interpretation, especially in the absence of support in the text.

Material

Specimens were examined from the following collections:

HNHM	Hungarian Natural History Museum, Budapest, Hungary
MZH	Finnish Museum of Natural History, Zoology Unit, University of Helsinki, Finland
NHMW	Naturhistorisches Museum Wien, Austria
SMNK	Staatliches Museum für Naturkunde, Karlsruhe, Germany
SZMN	Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia
ZIN	Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia
ZMKU	Zoological Museum, Kiev National Taras Shevchenko University, Ukraine

Specimens were also examined from the private scientific collections of Jari Junnilainen, Kari & Timo Nupponen and Zdenko Tokár. Jukka Tabell kindly donated his material to MZH, so it is denoted under this collection. Type specimens deposited in the private scientific collections of J. Junnilainen and K. & T. Nupponen are available either directly from the collection owners or via MZH; specimens in the scientific collection of Z. Tokár directly from him.

Terminology and methods

The terminology of anatomical structures follows Traugott-Olsen & Nielsen (1977), Kaila (1997, 1999) and Kaila & Sugisima (2011). The specific epithets of the new species are names in apposition. Taxonomic decisions applied here are primarily based on characteristics of genitalia. DNA barcodes, when available, were used as a source of further insight, especially when genitalia showed variation. They were also used in associating the male and female of *E. cisoria* **sp. nov.**, *E. drepanella* **sp. nov.** and *E. mus* Parenti. Genital images were edited using Corel Photopaint X8. Sometimes the image of the phallus was flipped to show it positioned identically across species, in order to facilitate comparison. The length of uncus, when related to the length of the incision between uncus lobes, was determined from the apex to the sulcus between uncus (tergum X, with socii) and tegumen (tergum IX); length of the uncus lobe was determined from its longest point to the base of the incision between the uncus lobes; length of a papilla analis was measured from its most distal point to the joint of the ventral Y-shaped sclerotization that connects the two papillae anales. The term antrum was used for the part of ductus bursae that is between the ostium bursae and the inception of ductus seminalis.

Shape and size of several genitalia structures vary to some extent. In part, this is due to the varying level of pressure applied in preparing slide mounts. That affects the apparent shape of the uncus lobes, and the width of the phallus in particular. Likewise, the position of the phallus may give quite a different impression of the shape of its apex. The shape of the gnathos would be best to determine prior to permanent slide mounting. Its shape is easily distorted, so description of its shape or size may need to be used with caution. It is apically bent in the dorsal direction (cf. Kaila 1999), so a strong pressure applied in slide mounting might end up displaying it disproportionately long if the distal part is straightened, or short if the distal part is folded. Whether it is drop-shaped or oval may also be impossible to distinguish, either because of intraspecific variation or its position in the slide. In several cases, parts of the genitalia are either rather compact or elongated, both general shapes nevertheless giving similar ratios of, e.g., the relative length of valva, phallus and digitate process. Yet, in images the differences are easier to discern. Some differences can usually be evaluated directly from the slides but are more difficult to discern in photos, or to express in words in a manner that makes their comparison across species

clear. The point from where the measurements were taken was not always easy to assess as exactly the same among specimens. Therefore the ratios, when given, are approximate. In diagnoses, some species are not compared to all relevant relatives – the morphology among all species involved is quite homogeneous – to avoid extensive repetition, a consequence of different combinations of similar traits in different species. To aid navigation in identifications a key is given. Diagnoses and the key should be used simultaneously to reach the correct identification.

A total of 42 specimens of the *E. subula* species complex were successfully subjected to sequencing of the barcoding region of the mitochondrial COI gene. DNA extraction and sequencing were performed at the Canadian Centre for DNA Barcoding largely following the standard protocol. Data for these samples are deposited in the BOLD database (www.boldsystems.org) in a public project "DNA barcodes for *Elachista subula* complex". Details of specimens, including Genbank accession numbers, are accessible in that project. Construction of a neighbor-joining tree and distance calculations were performed using BOLD analytical tools.

Key to males

External appearance mostly gives few reliable characters. Some species seem always to be unicolorous white or creamy, others have two darker spots on the forewing. There is, however, intraspecific variation, and the presence of the spots may be difficult to assess if they are very faint, or a specimen is even slightly worn. Therefore this key is based solely on male genitalia. Because some characters used in this key show intraspecific variation or are vulnerable to distortion in dissection, the same species may be included in more than one couplet (see also above).

1. Juxta lobe sickle-shaped . . . . . *E. subula*
- Juxta lobe either medially produced, or its distal margin straight or at most slightly convex 2
2. Uncus lobe twice as long as wide, parallel-sided . . . . . *E. acutella*
- Uncus lobe less than twice as long as wide, not parallel-sided. 3
3. Uncus lobe as long as broad . . . . . *E. cultella*
- Uncus lobe broader than long 4
4. Juxta lobe medially produced 5
- Juxta lobe medially either rounded or median and distal margin joined at an obtuse angle. 8
5 Length of phallus 3/4 of the length of valva . . . . . *E. marusiki*
- Length of phallus at most 3/5 of the length of valva 6
6. Median margin of juxta basally convex and distally straight or concave . . . . . *E. bimaculata*
- Median margin of juxta evenly convex. 7
7. Valva distinctly narrower in distal part than basally, termen straight; juxta lobe acute-tipped. . . . . *E. platamodes*
- Valva hardly narrowed towards apex, termen rounded; juxta lobes rounded at apex . . . . . *E. semnani*
8. Juxta lobe 1.5. times as long as wide . . . . . *E. cultella*
- Juxta lobe not longer than wide. 9
9. Length of phallus 3/4 of the length of valva . . . . . *E. marusiki*
- Length of phallus at most 3/5 of the length of valva. 10
10. Gnathos rounded 11
- Gnathos elongate or drop-shaped 14
11. Distal half of valva distinctly narrower than basal half . . . . . *E. ameteria*
- Distal half of valva as broad as basal half 12
12. Digitate process shorter than juxta lobe . . . . . *E. cisoria*
- Digitate process as long as, or longer than, juxta lobe 13
13. Juxta lobe less than 1.5x as long as its width . . . . . *E. perona*
- Juxta lobe as wide as long . . . . . *E. spinipyra*
14. Digitate process shorter than juxta lobe . . . . . *E. cisoria*
- Digitate process as long as, or longer than, juxta lobe 15
15. Width of valva 1/5–1/4 of its length at its narrowest place beyond middle; around middle of valva on costal side of valva thickened, elongate scales . . . . . *E. drepanella*
- Width of valva less than 1/5 of its length at its narrowest place beyond middle; no specialized scales present on middle of costa of valva 16
16. Valva of equal width to cucullus . . . . . *E. spinipyra*
- Valva narrowed on distal half than on basal part 17
17. Juxta lobe 3/4 as long as digitate process . . . . . *E. scalpra*
- Juxta lobe 3/5 as long as digitate process . . . . . *E. mus*

Key to females

The females of the following species are unknown and not included in the key: *E. acutella, E. bimaculata*, *E. cultella*, *E. marusiki*, *E. platamodes*, *E. semnani*, *E. scalpra* and *E. spinipyra*. As usually only one or at most a few female specimens have been available for this study, and because so large a portion of species could not be included, this key is tentative.

1. Signum absent; papillae anales entirely membranous, apically rounded 2
- Signum present; papillae anales basally sclerotized, apically acute 4
2. Posterior, widened and rugose part of ductus bursae 2x as long as broad 3
- Posterior, widened and rugose part of ductus bursae 3x as long as broad . . . . . *E. drepanella*
3. Length of antrum equal to the wrinkled dilation of ductus bursae . . . . . *E. cisoria*
- Length of antrum 1/3 of the wrinkled dilation of ductus bursae . . . . . *E. subula*
4. Antrum narrowing towards inception of ductus seminalis; sclerotized area laterad of ostium bursae occupying half of the distance between apophyses anteriores . . . . . *E. perona*
- Antrum parallel-sided; sclerotized area laterad of ostium bursae occupying 1/3 of the distance between apophyses anteriores . . . . . *E. mus*

Taxonomy

Elachista subula Parenti, 1991

Figs. 2, 3, 24, 25, 49, 50

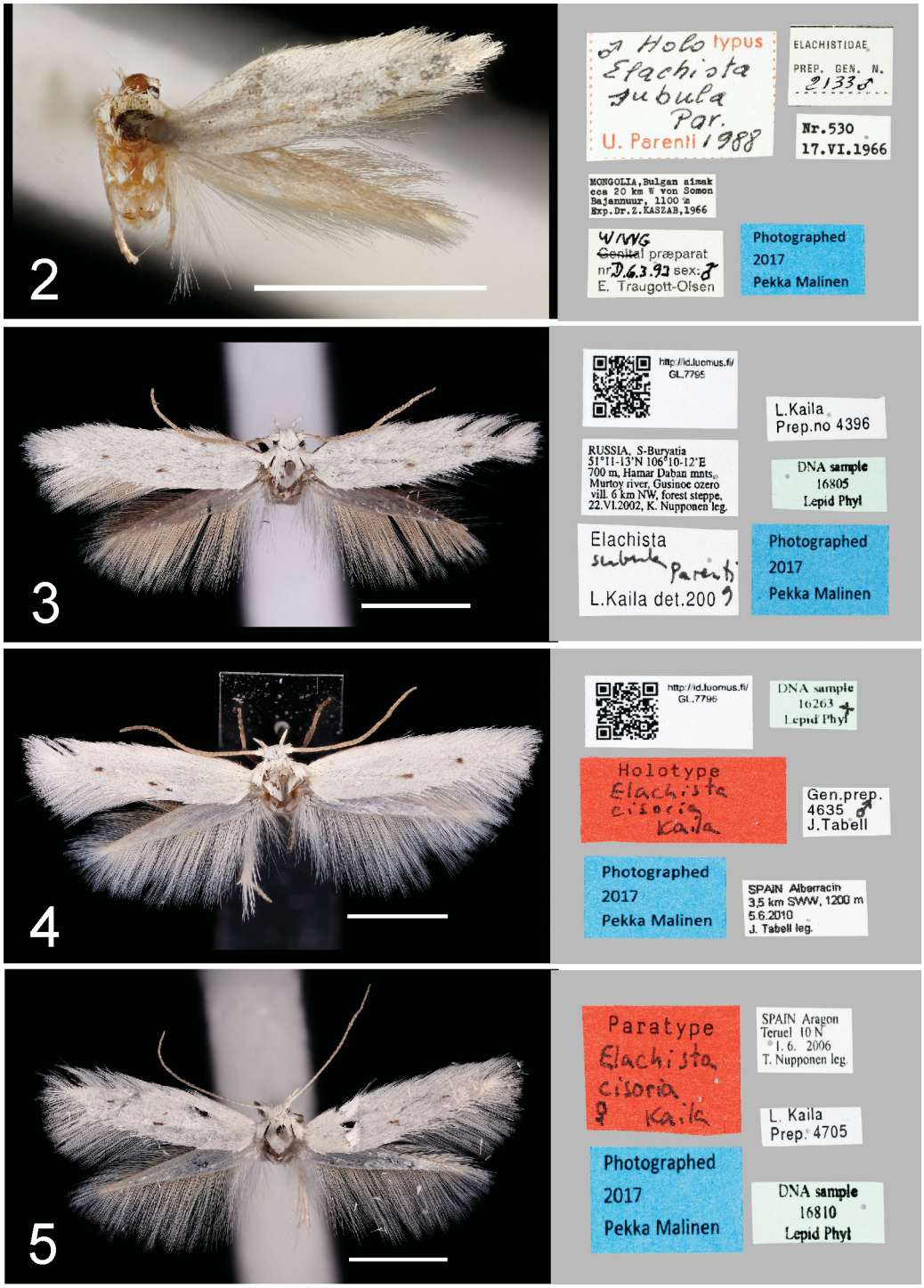
Elachista subula Parenti, 1991: 210.

Material examined. Type material: holotype ♂ (examined): Mongolia, Bulgan aimak, ca 20 km W von Somon Bajan-nuur, 1100 m, Exp. Dr. Kaszab, 1966; ♂ Holotype *Elachista subula* Par. U. Parenti 1988; Elachistidae prep. gen. 2133 ♂ (HNHM).

Other material: **Mongolia**: 43°21'N 103°11'E, 1700 m, Omnogov Aimak, Bayandalai, Somon Zoolen uul, 27.–30.v.1997, 2 ♂, Yu. Marusik leg. (L. Kaila prep. 3946, 3947; MZH); Tov Aimak, 48°22'N 106°18'E, 1100 m, 18.–23.vi.1997, 2 ♂, Yu. Marusik leg. (L. Kaila prep. 3944, 3945; MZH). **Russia**: Altai Mts., 50°14–16'N 87°50–55'E, 1500–1700 m, Kuraiskaja step, 27.vi.2000, 1 ♂, T. & K. Nupponen leg. (L. Kaila prep. 3953, Coll. Nupponen); S. Buryatia, 51°11–13'N 106°10–12'E, 700 m, Hamar Daban Mts., Murtoy River, 6 km NW Gusinoe ozero village, forest steppe, 19.–21.vi.2002, 13 ♂ 1 ♀, K. Nupponen leg. (L. Kaila prep. 4153, 4385, 4395, 4396, 4817, 4816; DNA samples 16805–7 Lepid. Phyl.; Coll. Nupponen, 2 ♂ in MZH); Buryatia pr. Ulan-Ude, 700 m, 35 km SW Ulan-Ude, steppe hill, 17.vii.1996, 4 ♂, Jalava & Kullberg leg. (L. Kaila prep. 3948, 3949; MZH); Tuva: Tannu-Ola Mts., Irbitei 50°44'N 93°08'E, 13.–16.vi.1995, 11 ♂ 1 ♀ Jalava & Kullberg leg. (L. Kaila prep. 1661, 1671, 1676, 1677, 6143; MZH); 50°16'N 94°57'E, 1250 m, 25 km W. Erzin, 1250 m, steppe/stony slopes, 7.–11.vi.1995, 2 ♂, Jalava & Kullberg leg. (L. Kaila prep. 2202; MZH); 50°45'N 94°29''E, 1250 m, E. Tannu-Ola Mts., 5 km ENE Khol-Oozha, steppe slopes, 16.–19.vi.1995, 1 ♂, Jalava & Kullberg leg. (L. Kaila prep. 1656; MZH); Transbaikalia, Chita reg., Kyra, 900 m, 18.vii.1997, A. Bidzilya, I. & O. Kostjuk leg. (L. Kaila prep. 3935, [*E. bimaculata* Par. Bidzilya det.]; ZMKU).

Diagnosis. *Elachista subula* has forewing ground colour varying from white to pale cream. It has distinct, elongate brownish grey plical and discal spots on forewing. The phallus is wider than in most other species, most closely resembling that of *E. cisoria.* In the male genitalia the most distinctive character is the sickle-shaped juxta lobe which distinguishes *E. subula* from all other species in this species complex. The female genitalia are devoid of signum; the wide antrum is characteristic, similar to that of *E. cisoria.* In *E. subula* length of the antrum is 1/3 of the wrinkled dilation of ductus bursae, while in *E. cisoria* it is equally long. A similarly expanded posterior part of ductus bursae is present in species of the *E. bedellella* species complex. In these species it is not wrinkled. They are also usually externally quite different (Kaila 2007).

Molecular characterization. The maximum intraspecific variation among the three included specimens was 0.15 %. Of the species included the closest taxon in terms of similarity of barcodes is *E. spinipyra* (distance 5.08 %).



FIGURES 2–5. Adults of *Elachista* spp. Scale 2 mm. 2. *E. subula* Parenti, ♂ holotype. 3. *E. subula* ♂ (Russia: S. Buryatia). 4. *E. cisoria* Kaila, **sp. nov.**, ♂ holotype. 5. *E. cisoria* Kaila, **sp. nov.**, ♀ paratype (Spain, Aragon, Teruel).

Redescription. Forewing length 4–5 mm. Labial palpus straight or slightly upcurved, white to cream, length 0.8x diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white to cream; scape with distinctive pecten formed of elongate, white scales; flagellum brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing ground colour varying from white to cream, with faintly expressed grey plical spot in the middle of wing length at fold, and similar discal spot at 2/3 wing length; basal third of costa narrowly nearly black. Fringe pale ochreous grey. Hindwing grey with concolorous fringe. Underside of both wings grey, apex of forewing shortly yellowish.

Male genitalia. Uncus lobe nearly rounded, as broad as or slightly broader than long, ventrally sparsely covered by setae along margin, lobes separated by broad V-shaped incision, depth of which half the length of uncus. Spinose knob of gnathos elongate, small, its length less than width of uncus lobe. Valva 4x as long as wide at its widest point in the distal ¾; sacculus slightly concave medially, otherwise valva parallel-sided; cucullus indistinctly delineated, rounded. Digitate process 1/5x as long as valva, parallel-sided, tongue-shaped, distal 2/3 with setae. Juxta lobe sickle-shaped, 1.2x as long as digitate process, with a few setae near distal margin. Median plate of juxta posteriorly with dorsally projected, curved lobe. Vinculum short and broad, U-shaped. Phallus 0.6–0.7x as long as valva; approximately 7x as long as broad at its broadest place at distal 3/5 [the phallus of the holotype is pressed to distortion, cf. Fig. 24]; from distal 1/4 abruptly tapered into strongly sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, weakly sclerotized plate with one blunt tooth that is almost equal to the plate in size.

Female genitalia. Papillae anales membranous with nearly rounded apex; dorsoventrally with Y-shaped connecting sclerotization. Apophysis posterioris slender, straight, 2x as long as papilla analis. Apophysis anterioris 2/3x as long as apophysis posterioris. Ostium bursae rounded. Antrum parallel-sided, as broad as ostium bursae between it and inception of ductus seminalis; anterior to inception of ductus seminalis ductus bursae inflated as wrinkled, oval-shaped dilation, length of which 3x antrum. Narrow part of ductus bursae shortly wrinkled posteriorly, otherwise straight, tubular, membranous; its total length 3.3x apophysis posterioris. Corpus bursae oval [in the image artificially folded, thus giving the impression of its being narrower than it is], with sparsely scattered internal granules; no signum present.

Biology. Immature stages are unknown. Adults fly actively at dusk, and are also attracted to UV light. The species inhabits xerothermic sites with low vegetation; it has been recorded in altitudes between 700 and 1700 m.

Distribution. Mongolia; Russia: Altai, Buryatia, Transbaikalia (Chita) and Tuva.

***Elachista cisoria* Kaila, sp. nov.**
Figs. 4, 5, 26, 27, 51, 52

Material examined. Type material: holotype ♂: Spain, Aragon, 3.5 km SSW Albarracin, 1200 m, 5.vi.2010 J. Tabell leg. (J. Tabell prep. 4635; DNA sample 16263 Lepid. Phyl.; MZH). Paratypes (6 ♂ 1 ♀): 1 ♂ with the same collecting data as in the holotype (DNA sample 16264 Lepid. Phyl; MZH); Hispania [Spain], Prov. Granada, Baza, 110 km Nö [NW] Granada, 22.–26.v.1979, 1 ♂, M. & W. Glaser leg. (L. Kaila prep. 5747; SMNK); Spain, Aragon, 7 km NW Albarracin, 1100 m, 4.vii.2010, 1 ♂, Z. Tokár leg. (L. Kaila prep. 5920; Coll. Tokár); Spain, Aragon, 10 km N. Teruel, 2 ♂ 1 ♀, 1.vi.2006, T. Nupponen leg., (L. Kaila prep. 4703, 4704, 4705; DNA samples 16808–10 Lepid. Phyl.; Coll. Nupponen); Spain, 40°25'N 1°04'E, 960–1030 m, Aragon, Prov. Teruel, 9 km NNE Teruel, Villalba Baja, 13.vi.2008, 1 ♂, K. Nupponen leg. (J. Tabell prep. 4662, DNA sample 11416 Lepid. Phyl.; Coll. Nupponen).

Diagnosis. In many respects, *E. cisoria* resembles *E. subula.* For example, they both have a broad phallus as compared to other species in the *E. subula* species complex. These two species differ in that *E. subula* has characteristic, sickle-shaped juxta lobes, whereas these lobes are elongate in *E. cisoria.* Otherwise, they are similar to several other species in the complex. However, the drop-shaped gnathos, and digitate process that is shorter than the juxta lobes, distinguish *E. cisoria* from these other species. The female genitalia are characterized by the absence of signum, and by the wide antrum, similar to that of *E. subula* and *E. drepanella.* In *E. drepanella* the posterior, rugose and widened part of ductus bursae is 3x as long as wide, in *E. subula* and *E. cisoria* 2x as long as wide. These two species are distinguished from each other by the length of antrum, which in *E. cisoria* is equal in length to the dilated part of the ductus bursae, whereas in *E. subula* it is 1/3 as long as the dilated part of the ductus bursae.

Molecular characterization. The maximum intraspecific variation among the six included specimens was 0.31 %. Of the species included the closest taxon in terms of similarity of barcodes is *E. drepanella* (distance 2.18 %).

Description. Forewing length 4–5 mm. Labial palpus straight, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white to cream; scape with distinctive pecten formed of elongate, white scales; flagellum brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally shortly

pale; hindleg cream, spurs grey, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing ground colour varying from white to pale cream, with variably expressed brownish grey plical spot in the middle of wing length at fold, and similar discal spot at 2/3 wing length; sometimes a few additional scales of similar colour in distal third, basal third of costa narrowly nearly black; fringe white. Hindwing grey with concolorous fringe. Underside of forewing dark grey, in basal third two pale longitudinal lines; fringe white. Underside of hindwing pale grey, translucent, except on costal side where it is dark; fringe pale grey.

Male genitalia. Uncus lobe nearly rounded, as broad as long, ventrally sparsely covered by setae along distal and distolateral margins, lobes slightly apart from each other, depth of incision between them half the length of uncus. Spinose knob of gnathos drop-shaped or oval, slightly longer than width of uncus lobe. Valva 5x as long as wide at its widest point in the distal 3/4; sacculus slightly concave medially, valva otherwise parallel-sided; cucullus indistinctly delineated, rounded. Digitate process 1/6x as long as valva; parallel-sided, tongue-shaped, distal 2/3 with setae. Juxta lobe as long as digitate process; median plate of juxta longer than wide, posteriorly with dorsally projected, curved lobe. Vinculum short and broad, U-shaped. Phallus 0.6–0.7x as long as valva, slightly bent; approximately 7x as long as broad at its broadest place at distal 3/5; from distal 1/4 abruptly tapered into strongly sclerotized, acute-tipped apex. From distal 1/4 gradually tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized plate with one blunt tooth that is almost equal to the plate in size.

Female genitalia. Papillae anales membranous with nearly rounded apex; dorsoventrally with Y-shaped connecting sclerotization. Apophysis posterioris slender, straight, 2x as long as papilla analis. Apophysis anterioris 2/3x as long as apophysis posterioris. Ostium bursae rounded, surrounded by horseshoe-shaped sclerotization of sternum 8. Antrum posteriorly somewhat dilated, anteriorly tubular, the length of tubular part equal to that of dilation; anterior to inception of ductus seminalis ductus bursae inflated as wrinkled, oval-shaped dilation, length of which equal to antrum. Narrow part of ductus bursae straight, tubular, membranous, weakly granulose, gradually widened in anterior 1/4, incepted to corpus bursae without abrupt limit. Corpus bursae oval-shaped, very weakly granulose in posterior third, no signum present.

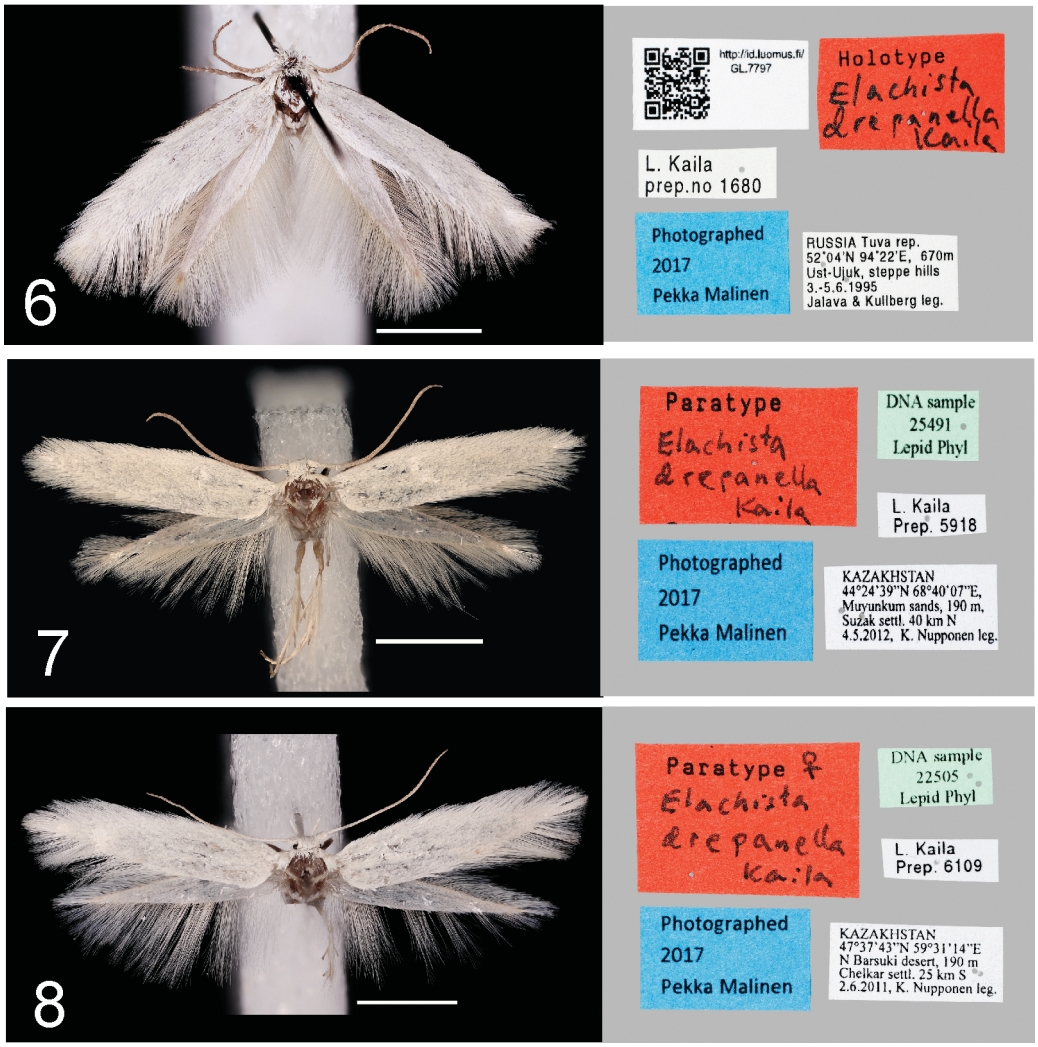
Biology. *E. cisoria* has only been collected by UV light. The habitat of the holotype is a gentle, south-facing slope with rich vegetation, yet with only few grass species observed, *Brachypodium retusum* being the most abundant of those. The species has been recorded from altitudes ranging from 960 to 1100 m.

Distribution. Spain.

Etymology. The name is derived from the Latin word *cisorium*, a kind of cutting instrument. This refers to the acute apex of the phallus.

***Elachista drepanella* sp. nov.**
Figs. 6, 7, 8, 28, 29, 30, 53

Material examined. Type material: holotype ♂: **Russia**: Tuva, 52°04’N 94°22’E, 670 m, Ust-Ujuk, steppe hills 3.–5.vi.1995, J. Jalava & J. Kullberg leg. (L. Kaila prep. 1663; MZH). Paratypes (25 ♂ 1 ♀): 3 ♂ with the same collection data as in the holotype (L. Kaila prep. 1668, 1678, 1680; MZH); Zabaikalie, Chita obl., Kyra, 900 m, 16.vii.1997, 1 ♂, A. Bidzilya, I. Kostyuk & O. Kostyuk leg. (Coll. ZMKU); Altai Mts., 50°14–16’N 87°50–55’E, Kuraiskaja step, 1500–1700 m, 25.vi.2000, 7 ♂, T. & K. Nupponen leg. (L. Kaila prep. 3941, 3954, 3956, 3958, 4140, 4138, 4139; Coll. Nupponen, 1 ♂ in MZH); S. Buryatia, 50°58–59’N 106°38-40’E, 550–600 m, Chikoy Valley, 10 km S Novoselenginsk vill., sand dunes/sandy steppe, 23.–24.vi.2002, 2 ♂, K. Nupponen leg. (L. Kaila prep. 4154, 4155; Coll. Nupponen). **Kazakhstan:** 44°24’39’’N 68°40’07’’E, 190 m, Muyunkum sands, 40 km N. Suzak settl., 4.v.2012, 2 ♂, K. Nupponen leg. (L. Kaila prep. 5918, DNA sample 25491 Lepid. Phyl., L. Kaila prep. 6069; Coll. Nupponen); 46°24’22’’N 59°35’30’’E, 180 m, 60 km E. Bozoi village, 7 km N. Aral Sea shore, 13.v.2010, 1 ♂, K. Nupponen leg. (L. Kaila prep. 5267, DNA sample 15348 Lepid. Phyl.; Coll. Nupponen); 43°48’45’’N 53°31’29’’E, 70 m, Sengirkum sands, Terekurpa well, 27.v.2011, 1 ♂, K. Nupponen leg., (DNA sample 22514 Lepid. Phyl.; Coll. Nupponen); 47°37’43’’N 59°31’14”E, 190 m, N. Barsuki desert, 21 km S. Chelkar settl., 2.–3.vi.2011, 8 ♂ 1 ♀, K. Nupponen leg. (L. Kaila prep. 6106–6109; DNA samples 22174, 22175, 22178, 22179, 22180, 22511, 22505, 22518, 22562 Lepid. Phyl.; Coll. Nupponen, MZH).



FIGURES 6–8. Adults of *E. drepanella* Kaila, **sp. nov.** Scale 2 mm. 6. ♂ holotype. 7. ♂ paratype (Kazakhstan, Muyunkum sands). 8. ♀ paratype (Kazakhstan, Barsuki desert).

Diagnosis. *E. drepanella* is a creamy white species, with no markings on forewing, and externally possibly indistinguishable from *E. ameteria* and *E. scalpra*. *E. scalpra*, however, is chalky white based on the few specimens known. The genitalia of *E. drepanella* genitalia are most similar to those of *E. subula* and *E. cisoria*, but *E. drepanella* is on average larger than these two species, both of which also have distinctive plical and discal spots on the forewing. The phallus is narrower in *E. drepanella* than in *E. subula* and *E. cisoria*, but the level of pressure applied in mounting of genital slide easily distorts this trait. The valva is large as related to other parts of the genitalia (difficult to express by measurements but easier to discern from photographs. Juxta lobes are generally similar to those of most other species. They are slightly longer than wide, and the median margin joins the distal margin at a sharp angle. The valva of *E. drepanella* is broader in general, and especially in distal half, than in both *E. ameteria* and *E. scalpra.* A disntinctive characteristic of *E. drepanella* is the presence of elongate, thickened scales on on costal side of valva around middle of valva's length. The female genitalia are characterized by a swollen, rugose posterior part in the ductus bursae that is similar to that seen in *E. subula* and *E. cisoria*. It is 3x as long as wide in *E. drepanella*, 2x as long as wide in these other species.

Molecular characterization. The maximum intraspecific variation among the 12 included specimens was 0.46 %. Of the species included the closest taxon in terms of similarity of barcodes is *E. cisoria* (distance 2.18 %).

Description. Forewing length 5–7 mm. Labial palpus straight, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna creamy white; scape with distinctive pecten formed of elongate, creamy white scales; flagellum cream in basal third, distally brown. Fore- and midleg inwardly grey, outwardly white, tarsal articles distally shortly pale; hindleg pale grey, spurs darker grey, tibia and tarsus above grey with

distally pale tibia and tarsal articles. Forewing unicolorous pale cream except basal third of costa narrowly nearly black. Fringe concolorous with forewing. Hindwing very pale grey, somewhat translucent with concolorous fringe. Underside of forewing dark grey, in basal third two pale longitudinal lines; fringe grey except white near apex. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.

Male genitalia. Uncus lobe nearly rounded, slightly broader than long; ventrally sparsely covered by setae especially along distolateral area, lobes separated by V-shaped incision, depth of which 1/3 the length of uncus. Spinose knob of gnathos drop-shaped or oval, about as long as the width of uncus lobe. Valva 4.4–4.5x as long as wide at its widest point in the middle and in cucullus, costa slightly concave in basal half, valva otherwise parallel-sided; cucullus indistinctly delineated, rounded. Digitate process 0.2x as long as valva, parallel-sided, tongue-shaped, distal 2/3 with setae. Juxta lobe as long as digitate process, its median margin straight, joining distal margin at a right angle, distal margin slightly convex; group of setae on somewhat rugose area near distal margin; lateral margin concave. Median plate of juxta developed as dorsally projected lobe. Vinculum short and broad, U-shaped. Phallus 0.6x as long as valva; approximately 9x as long as broad at its broadest place at distal 3/5; weakly bent, distally tapered to pointed apex. Vesica with cornutus that consists of oval, weakly sclerotized plate with one or two small blunt teeth.

Female genitalia. Papillae anales membranous with nearly rounded apex; dorsoventrally with Y-shaped connecting sclerotization. Apophysis posterioris slender, straight, 2x as long as papilla analis. Apophysis anterioris 2/3x as long as apophysis posterioris. Ostium bursae narrow, laterally sclerotized. Antrum tubular; anterior to inception of ductus seminalis ductus bursae inflated as wrinkled, oval-shaped dilation, length of which 1.5 times as long as antrum, width 1/3 its length. Narrow part of ductus bursae in posterior third with longitudinal foldings; ductus bursae otherwise gradually widened towards corpus bursae, anteriorly weakly granulose. Corpus bursae oval-shaped, posteriorly weakly granulose, no signum present.

Biology. *E. drepanella* inhabits different kinds of xerothermic steppe habitats and hot sandy deserts. The altitude of known localities ranges from 190 to 900 m. Immature stages are unknown.

Distribution. S. Kazakhstan, Russia (Transbaikalia, Buryatia, Tuva).

Etymology. The name is derived from the Greek word *drepanon*, a sickle. This refers to the shape of the distal part of the phallus.

***Elachista ameteria* Kaila, sp. nov.**
Figs. 9, 31, 32

Material examined. Type material: holotype ♂: Kazakhstan, 44°24’39”N 68°40’07”E, 190 m, Muyunkum sands, 40 km N. Suzak settl., 4.v.2012, K. Nupponen leg. (L. Kaila prep. 6070; Coll. Nupponen). Paratype ♂: Kazakhstan, 48°55’29”N 58°18’49”E, 300 m, 17 km NE Emba vill., 18.v.2012, K. Nupponen leg. (L. Kaila prep. 6074; Coll. Nupponen).

Diagnosis. *E. ameteria* is a creamy white species, with no markings on forewing, externally possibly indistinguishable from *E. drepanella* and *E. scalpra*. The valva of *E. drepanella* differs from that of *E. ameteria* in being larger, and in not being narrowed in the distal half. The genitalia of *E. ameteria* are most similar to those of *E. scalpra,* in both of which the valva is distally narrower than in basal half. These species differ in the shape of the gnathos which is elongate in *E. scalpra*, rounded in *E. ameteria*.

Molecular characterization. No material was available for genetic study.

Description. Forewing length 5–7 mm. Labial palpus straight, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna creamy white; scape with distinctive pecten formed of elongate, creamy white scales; flagellum cream in basal fifth, otherwise reddish brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally white; hindleg pale grey, spurs somewhat darker grey, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing unicolorous white except basal third of costa narrowly nearly black. Fringe concolorous with forewing. Hindwing almost white with concolorous fringe. Underside of forewing dark grey, in basal third two pale longitudinal lines; fringe white. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.

Male genitalia. Uncus lobe rounded, as broad as long, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow incision, depth of incision between them 1/3 the length of uncus. Spinose knob

of gnathos rounded, as broad as uncus lobe. Valva 5x as long as wide at its widest point in the middle, distal half distinctly narrower than basal half; parallel-sided except the narrowing in costa beyond middle of the length. Cucullus indistinctly delineated, elongate. Digitate process 0.25x as long as valva; parallel-sided, distally rounded, distal 2/3 with setae. Juxta lobe as long as digitate process; median plate of juxta rounded, medially with dorsally projected, curved lobe. Vinculum short and broad, U-shaped. Phallus 0.7x as long as valva, straight, gradually tapered towards apex; 9x as long as broad at its broadest place at base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one or two small, blunt teeth.

Female genitalia. Unknown.

Biology. The habitat in Muyunkum sands is a large xerothermic sand dune area with sparse vegetation, and by Emba the species inhabits chalk steppes. The moth flies at dusk and comes to UV light.

Distribution. S. & W. Kazakhstan.

Etymology. The name is derived from the Greek word *ameterion*, a sickle. This refers to the shape of the distal part of the phallus.

***Elachista scalpra* Kaila, sp. nov.**

Figs. 10, 33, 34

Material examined. Type material: holotype ♂: Turkey, 5 km NW. Ürgüp, 17.vi.1999, J. Junnilainen leg. (J. Tabell prep. 4482; Coll. Junnilainen). Paratypes (2 ♂): Turkey, 5 km W. Yesilhisar, 20.–21.vi.1999, 1 ♂, J. Junnilainen leg. (L. Kaila prep. 5866; MZH); Turkey, 38°40'N 34°53E, 1100 m, 3 km N. Ürgüp, 11.vi.2002, T. Nupponen leg. (L. Kaila prep. 4316, DNA sample 21332 Lepid. Phyl.; Coll. Nupponen).

Diagnosis. *E. scalpra* is a chalky white species, with no markings on forewing, externally possibly indistinguishable from *E. drepanella* and *E. ameteria*. The chalky white forewing colour, observed in all known specimens, may differentiate *E. scalpra* from the other species whose forewings are creamy white. The most distinctive trait of *E. scalpra* is the large, elongate spinose knob of the gnathos. Otherwise, the separation of these species is explained in the diagnosis of *E. ameteria.*

Molecular characterization. One specimen was barcoded. Of the species included the closest taxon in terms of similarity of barcodes is *E. mus* (distance 1.61 %).

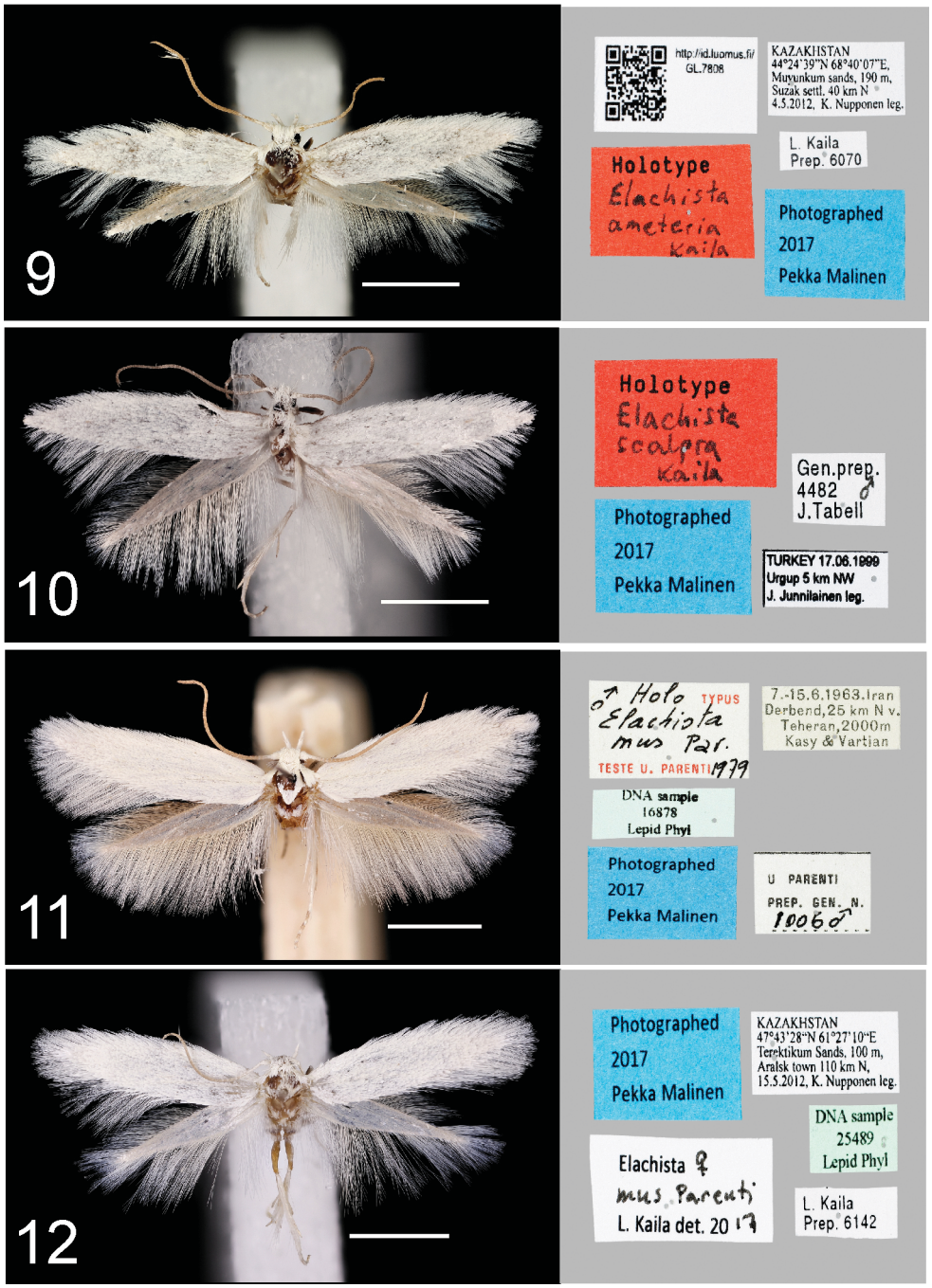
Description. Forewing length 4.5–6 mm. Labial palpus straight, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna creamy white; scape with distinctive pecten formed of elongate, creamy white scales; two basal segments of flagellum cream in basal fifth, flagellum otherwise brown. Fore- and midleg inwardly brownish grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs somewhat darker grey, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing unicolorous, chalky white, basal third of costa narrowly nearly black. Fringe concolorous with forewing. Hindwing pale grey with concolorous fringe. Underside of forewing grey, in basal third pale longitudinal line along fold; fringe white. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.

Male genitalia. Uncus lobe rounded, as broad as long, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow incision, depth of incision between them 1/3 the length of uncus. Spinose knob of gnathos elongate, oval-shaped, length 1.5x width of uncus lobe. Valva 6x as long as wide in the middle, distal half distinctly narrower than basal half. Valva parallel-sided except the narrowing in costa beyond middle of the length. Cucullus indistinctly delineated, elongate. Digitate process 0.2–0.25x as long as valva; parallel-sided, distally rounded, distal 2/3 with setae. Juxta lobe approximately as long as digitate process; median plate of juxta conical, posteriorly with dorsally projected, curved lobe. Vinculum short and broad, U-shaped. Phallus 0.65–0.7x as long as valva, slightly bent (s-shaped), gradually tapered towards apex; 9x as long as broad at its broadest place at base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one small, blunt tooth.

Female genitalia. Unknown.

Biology. Holotype and one paratype have been collected by sweeping vegetation at dusk. The habitat is a SE–SW facing, dry, calcareous sandstone slope with sparse vegetation (J. Junnilainen, pers. comm.).

Distribution. Turkey (Cappadokia).



FIGURES 9–12. Adults of *Elachista* spp. Scale 2 mm. 9. *E. ameteria* Kaila, **sp. nov.**, ♂ holotype. 10. *E. scalpra* Kaila, **sp. nov.**, ♂ holotype. 11. *E. mus* Parenti, ♂ holotype. 12. *E. mus* Parenti, ♀ (Kazakhstan, Terektikum sands).

Etymology. The name is derived from the Latin word *scalprum*, a chisel. This refers to the acute apex of the phallus.

***Elachista mus* Parenti, 1981**

Figs. 11, 12, 35, 36, 54

Elachista mus Parenti, 1981: 51.

Material examined. Type material: holotype ♂: Iran, Derbend, 25 km N Teheran, 2000 m, 7.–15.vi.1963, Kasy &

Vartian leg. (U. Parenti Prep. 1006, DNA sample 16678 Lepid. Phyl. (barcoding unsuccesful); NHMW). Other material: **Kazakhstan:** 47°43’28’’N 51°27’10’’E, 100 m, Terektikum Sands, 110 km N Aralsk Town, 15.v.2012, 1 ♀, K. Nupponen leg. (L. Kaila prep. 6142, DNA sample 25489 Lepid. Phyl.; Coll. Nupponen); 43°47’03’’N 68°03’15’’E, 540 m, Karatau Mts., 60 km N Turkestan town, 11.v.2010, 1 ♂, K. Nupponen leg. (L. Kaila prep. 5285, DNA sample 15353 Lepid. Phyl.; Coll. Nupponen); 48°55’29’’N 58°18’49’’E, 300 m, 17 km NE Emba Vill., 18.v.2012, 1 ♂, K. Nupponen leg. (DNA sample 25490 Lepid. phyl.; MZH); 44°24’39’’N 68°40’07’’ same collecting data, 12.v.2010 3 ♂, L. Kaila prep. 5915, 6071, 6075 (Coll. Nupponen), same collecting data, 20.v.2012 1 ♂, L. Kaila prep. 6075 (Coll. Nupponen); 44°24’39’’N 68°40’07”E, 190 m, Muyunkum Sands, 40 km N Suzak settl., 4.v.2012 1 ♂, K. Nupponen leg. (L. Kaila prep. 6071; Coll. Nupponen); 48°55’29’’N 58°12’49’’E, 470–520 m, N. Mugozhary mts., 45 km W. Altyndy vill., 8.v.2012, 1 ♂ 19.v.2012, 1 ♂, K. Nupponen leg. (L. Kaila prep. 5015, 5917, DNA samples 25484, 25485 Lepid. Phyl.; MZH, Coll. Nupponen). **Uzbekistan:** Shamansaj, 140 km NW Shafrikana, 24.v.1968, 1 ♂, Falkovitsh leg. (L. Kaila prep. 5858; ZIN); Shamansaj, Kyzyl-kum, 20.v.1967, 1 ♂, Falkovitsh leg. (L. Kaila prep. 6119), 26.v.1970, 2 ♂, Falkovitsh leg. (L. Kaila prep. 5854, 5860; ZIN).

Diagnosis. *E. mus* is a unicolorous white species, externally similar to several other species in the *E. subula* species complex. The male genitalia are characterized by the narrow, elongate valva, the drop-shaped spinose knob of gnathos and the somewhat elongate, distally rounded juxta lobes. The female genitalia are characterized by the basally and dorsally sclerotized and tapered, acute-tipped papillae anales, and by a large, oval signum formed of a sclerotized plate that is covered by minute granules, and laterally bordered with small teeth. Both characters are similar to *E. perona* but differ from all other known females in the *E. dispilella* group. Rather, they are reminiscent of the females of species related to *E. hedemanni* (cf. Kaila 2012). Externally, the species related to *E. hedemanni* differ from those of the *E. subula* species complex as never having totally unicolorous forewing, nor discal or plical spots. A similar signum is found in *E. perona*. The female genitalia of *E. mus* and *E. perona* differ from each other as explained in the key.

Molecular characterization. The maximum intraspecific variation among the nine included specimens was 0.16 %. Of the species included the closest taxon in terms of similarity of barcodes is *E. scalpra* (distance 1.61 %).

Redescription. Forewing length 4–5.5 mm. Labial palpus straight, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna creamy white; scape with distinctive pecten formed of elongate, creamy white scales; two basal segments of flagellum white, flagellum otherwise brown. Fore- and midleg inwardly brownish grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs somewhat darker grey, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing unicolorous, chalky white, basal third of costa narrowly nearly black. Underside of forewing dark grey, in basal third two pale longitudinal lines, fringe white. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.

Male genitalia. Uncus lobe rounded, somewhat broader than long, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow u-shaped incision, depth of incision between them 1/3 the length of uncus. Spinose knob of gnathos drop-shaped, length approximately 1.5x width of uncus lobe. Valva 4.5–5x as long as wide in the widest point a little basal to middle. Valva parallel-sided. Cucullus indistinctly delineated, elongate. Digitate process 0.2–0.3x as long as valva, parallel-sided, distally rounded, distal 2/3 with setae. Juxta lobe approximately as long as digitate process; median plate of juxta nearly rounded, posteriorly with dorsally projected, curved lobe. Vinculum elongate, tapered, distally blunt. Phallus 0.5–0.4x as long as valva, slightly bent s-shaped, gradually tapered towards apex; 9x as long as broad at its broadest place at base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one or several small, blunt teeth; for variation in cornutus, see Parenti (1981).

Female genitalia. Papillae anales basally and dorsally sclerotized, with acute apex, dorsoventrally with Y-shaped connecting sclerotization. Apophysis posterioris slender, straight, 2x as long as papilla analis. Apophysis anterioris basally broad and indistinctly delineated, about 2/3x as long as apophysis posterioris. Ostium bursae narrow, bordered with rounded sclerotization; antrum as broad as ostium bursae, sclerotized and tubular; ductus bursae narrow and tubular, with no wrinkled posterior dilation, slightly widened towards corpus bursae, about 2.5x length of apophysis posterioris; indistinctly incepted to corpus bursae. Corpus bursae oval-shaped, with large, oval signum that is granulose and laterally shortly spinose; length of signum about 1/3 of corpus bursae.

Biology. The species inhabits various kinds of steppes, semideserts and sand dune areas.

Distribution. Iran, Kazakhstan, Russia: Caucasus (Sruoga *et al.* 2017), Uzbekistan. Parenti (1981, 1991) also

mentions Afghanistan, Mongolia and Turkey. As this species has proven to have several close relatives, possibly having been confused with *E. mus*, these records should be verified.

Elachista bimaculata Parenti, 1981

Figs. 13, 14, 37, 38

Elachista bimaculata Parenti, 1981: 51.

Material examined. Type material: holotype ♂: N. Iran, Berge östl. Semnan [Mountains east of Semnan], 18.vi.1963, Kasy & Vartian leg. (gen. prep. U. Parenti 937, DNA sample 16676 Lepid. Phyl. (barcoding unsuccessful); NHMW). Other material: Kyrgyzstan, 39°35'29.0''N 72°15'32.1''E, 2820 m, Alai Mts., Tengiz-Bai pass gate, 24.vii.2010, 12 ♂, K. Nupponen & R. Haverinen leg. (L. Kaila prep. 6110, 6111, 6112, 6113, DNA samples 22528, 22562, 22629, 22630, 22631 Lepid. Phyl.; MZH, Coll. Nupponen).

Diagnosis. *E. bimaculata* is a white or creamy white species, forewing variably with beige – brown plical and discal spots. They may be very indistinct or entirely absent. The identification is easiest by the shape of the juxta lobe, which is medially distinctly prolonged. Its median margin is somewhat s-shaped. The only other species with similar shaped juxta lobe are *E. platamodes* and *E. semnani*. In *E. platamodes* the phallus is 3/4 as long as valva, shorter in the two other species. The flagellum of antenna is dark grey in *E. platamodes*, pale brown in the other species. In *E. semnani* the valva is broader than that of *E. bimaculata*, and the median margin of juxta lobes is evenly convex.

Molecular characterization. There was no intraspecific variation among the six included specimens. Of the species included the closest taxon in terms of similarity of barcodes is *E. acutella* (distance 4.27 %).

Redescription. Forewing length 4–5 mm. Labial palpus straight or upcurved, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna creamy white; scape with distinctive pecten formed of elongate, creamy white scales; flagellum pale brown. Fore- and midleg inwardly brownish grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing unicolorous, white or cream white, often with indistinct brown discal and/or plical spots. Fringe concolorous with forewing. Hindwing white or very pale grey, with concolorous fringe. Underside of forewing brown, fringe scales white. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.

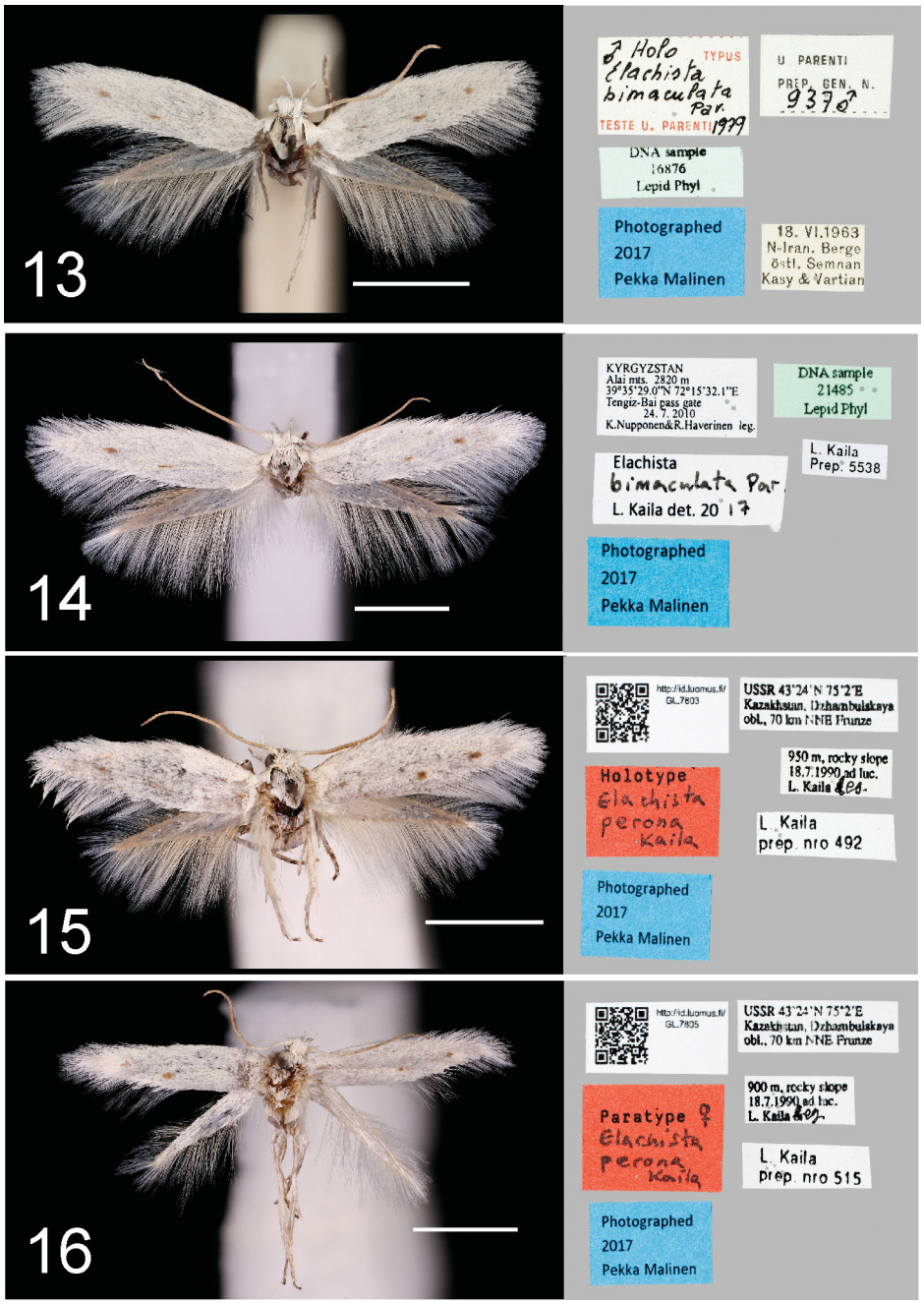
Male genitalia. Uncus lobe rounded, somewhat broader than long, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow u-shaped incision, depth of incision between them 1/3 the length of uncus. Spinose knob of gnathos rounded, as wide as uncus lobe. Valva 5.5–6x as long as wide in the widest point a little basal to middle; slightly bent in the holotype, straight in specimens from Kyrgyzstan. Cucullus indistinctly delineated, elongate, distally rounded, or shortly nearly straight. Digitate process 0.15–0.25x as long as valva [its base hard to define in the slides available], tongue-shaped, distal 2/3 with setae. Juxta lobe somewhat shorter than or as long as digitate process, distally markedly produced, with a few setae distally. Median margin basally convex, distally concave, joining distal margin at an acute angle; indistinct oblique fold from middle of distal margin. Median plate of juxta nearly rounded, posteriorly with dorsally projected lobe. Vinculum elongate, tapered, distally variably forming short saccus. Phallus 3/4 as long as valva, slightly bent, 9x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one or several small, blunt teeth.

Female. Unknown.

Biology. The habitat in Kyrgyzstan is a xerothermic slope at high altitude.

Distribution. Iran, Kyrgyzstan.

Remarks. The specimens from Kyrgyzstan: Alai Mts. are considered conspecific with the holotype of *E. bimaculata*, even though the shape of the uncus and the shape of juxta lobes seem to show minor differences between them. There is, however, some variation in the shape of the juxta among specimens from Kyrgyzstan. The apparent difference in the shape of uncus lobes in the holotype from Iran versus samples from Kyrgyzstan may be an artifact due to difference in pressure applied during slide preparation by different researches. It is, for the present, deemed likely that only one species is involved based on the material available.



FIGURES 13–16. Adults of *Elachista* spp. Scale 2 mm. 13. *E. bimaculata* Parenti, ♂ holotype. 14. *E. bimaculata* Parenti, ♂ (Kyrgyzstan, Alai mts., Tengiz-Bai pass). 15. *E. perona* Kaila, **sp. nov.**, ♂ holotype. 16. *E. perona* Kaila, **sp. nov.**, ♀ paratype (Kazakhstan, Dzhambulskaya oblast).

Elachista perona Kaila, sp. nov.

Figs. 15, 16, 39, 40, 55, 56

Material examined. Type material: holotype ♂: Kazakhstan, 43°24'N 75°2'E, 950 m, Dzhambulskaya obl., 70 km NNE Frunze [now Kyrgyzstan: Bishkek], rocky slope, 18.vii.1990, ad luc., L. Kaila leg. (L. Kaila prep. 492; MZH). Paratypes: 6 ♂ 1 ♀ with the same collecting data as in holotype (L. Kaila prep. 355, 391, 392, 491, 493, 497, 515, 4327; MZH).

Diagnosis. *E. perona* is a small, chalky white species with brown plical and discal spots on the forewing. It is close to *E. bimaculata*. Their distinctive difference is in the shape of the juxta lobes which are basally convex and

distally more or less concave in *E. bimaculata*, evenly convex in *E. perona.* Furthermore, the juxta lobes are markedly prolonged in *E. bimaculata*, not so in *E. perona.* This trait also distinguishes *E. perona* from *E. semnani.*

Molecular characterization. No material was available for genetic study.

Description. Forewing length 4.5 mm. Labial palpus straight or upcurved, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white; scape with distinctive pecten formed of elongate, white scales; flagellum pale brown. Fore- and midleg inwardly brownish grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Ground colour of forewing chalky white with variably developed and shaped brown plical and discal spots. Fringe concolorous with forewing ground colour. Underside of forewing dark grey, in basal third two pale longitudinal lines, fringe white. Hindwing white or very pale grey, with concolorous fringe. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.

Male genitalia. Uncus lobe rounded, somewhat broader than long, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow v-shaped incision, depth of incision between them 1/3 the length of uncus. Spinose knob of gnathos rounded, as wide as or slightly wider than uncus lobe. Valva 5x as long as wide, slightly bent. Cucullus indistinctly delineated, elongate, distally rounded. Digitate process 0.24x as long as valva, straight, distally blunt, distal 2/3 with a few setae. Juxta lobe as long as digitate process, distomedially somewhat produced; median margin convex joining distal margin without an angle, oblique fold from middle of distal margin; median part somewhat truncate to the fold. Median plate of juxta posteriorly with broad, dorsally projected lobe. Vinculum broad, U-shaped. Phallus 3/4 times as long as valva, slightly bent, 8x as long as broad at its broadest place at base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one small, blunt tooth.

Female genitalia. Papillae anales sclerotized, with acute apex, dorsoventrally with Y-shaped connecting sclerotization. Apophysis posterioris stout, 1.5x as long as papilla analis. Apophysis anterioris 0.5x length of apophysis posterioris. Ostium bursae laterally indistinctly delineated; antrum as broad as ostium bursae, sclerotized and tubular, anteriorly wrinkled; ductus bursae posteriorly with wrinkled narrow dilation, 2x length of antrum; ductus bursae otherwise membranous, tubular, weakly widened towards corpus bursae, total length about 3x length of apophysis posterioris. Corpus bursae oval-shaped, devoid of granules; with elongate-oval signum that is bordered with short teeth; length of signum about 1/3 of corpus bursae.

Biology. The specimens were attracted to UV light in submontane, xerothermic steppe habitat along a creek.

Distribution. SE. Kazakhstan.

Etymology. The name is derived from the Greek word *perone*, a pointed item aimed at piercing. This refers to the acute apex of the phallus.

Remarks. *E. perona* was reported as *E. bimaculata* by Kaila (1992).

Elachista semnani Parenti, 1981

Figs. 17, 41

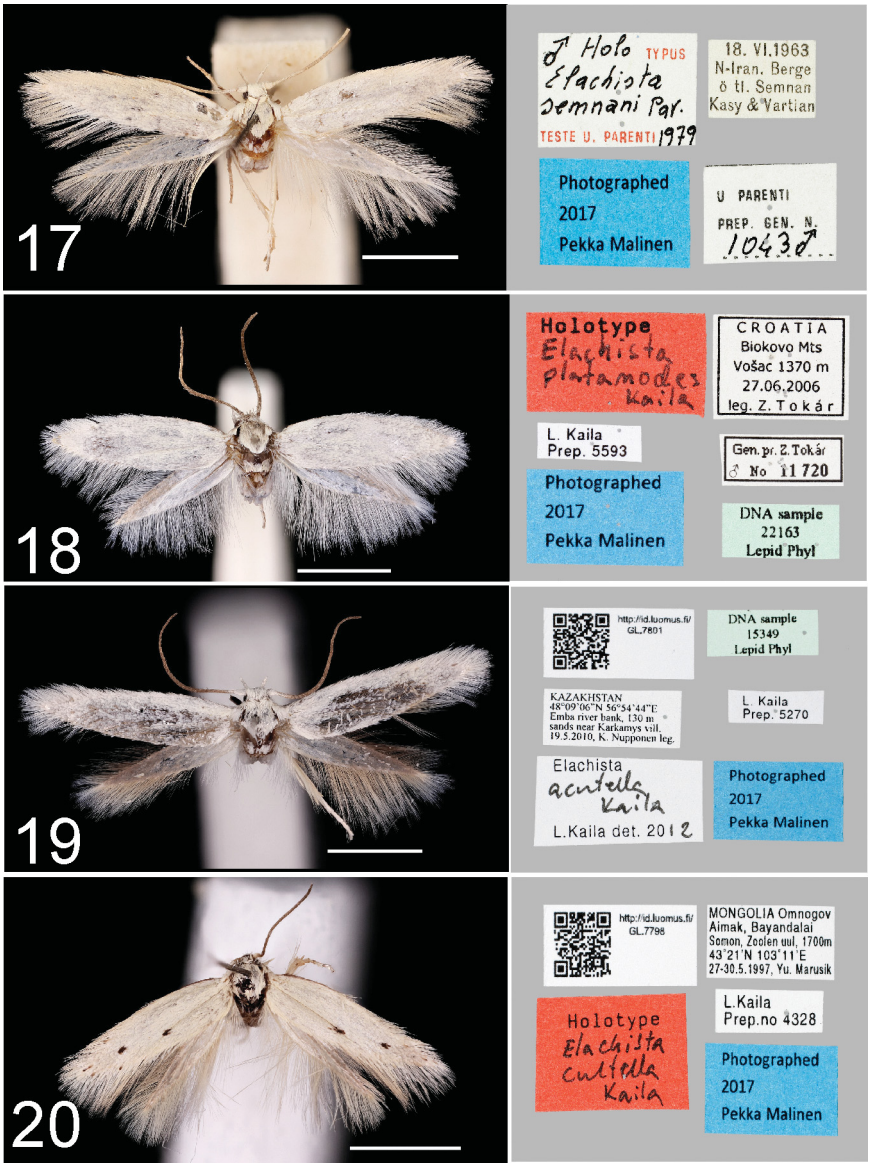
Elachista semnani Parenti, 1981: 52.

Material examined. Type material: holotype ♂: Iran, Berge ö tl. Semnan [Mts. East of Semnan], 18.vi.1963, Kasy & Vartian leg. (U. Parenti prep. 1043; NMNW).

Diagnosis. *E. semnani* closely resembles *E. bimaculata* and *E. platamodes*. See the diagnosis of *E. bimaculata* for identification of these species.

Molecular characterization. No material was available for genetic study.

Redescription. Forewing length 4.5 mm. Labial palpus slightly upcurved, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white; scape with distinctive pecten formed of elongate, white scales; flagellum brown with two basal segments white. Fore- and midleg brownish grey, laterally with white scales, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing unicolorous, chalky white, with concolorous fringe. Underside of forewing dark grey, in basal third two pale longitudinal lines, fringe white. Costal side of hindwing pale brownish grey, otherwise hindwing translucent, pale grey with concolorous fringe. Underside of hindwing pale grey, translucent, except on costal side where it is darker grey; fringe pale grey.



FIGURES 17–20. Adults of *Elachista* spp. Scale 2 mm. 17. *E. semnani* Parenti, ♂ holotype. 18. *E. platamodes* Kaila, **sp. nov.**, ♂ holotype. 19. *E. acutella* Kaila, ♂ (Kazakhstan, Emba river). 20. *Elachista cultella* Kaila, **sp. nov.**, ♂ holotype.

Male genitalia. Uncus lobe rounded, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow incision, depth of incision between them 1/3 the length of uncus. Spinose knob of gnathos rounded, as wide as uncus lobe. Valva 4.5x as long as wide in the widest point a little basal to middle, nearly straight. Cucullus indistinctly delineated, distally rounded. Digitate process 0.2x as long as valva, tongue-shaped, distal 2/3 with setae. Juxta lobe somewhat shorter than digitate process, distally markedly produced; with a few setae near apex, with indistinct oblique fold from middle of distal margin; median margin basally convex, distally concave, joining distal margin at an acute angle; distal margin straight, somewhat truncate between fold and median margin, joining lateral margin with a very obtuse angle; lateral margin concave; median plate of juxta posteriorly with dorsally projected curved lobe. Vinculum broad, U-shaped. Phallus 0.7–0.8x as long as valva, slightly bent, about 9x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one blunt tooth.

Female genitalia. Unknown.

Biology. Unknown.

Distribution. Iran.

***Elachista platamodes* Kaila, sp. nov.**
Figs. 18, 42

Material examined. Type material: holotype ♂: Croatia, Biokovo Mts., Vošac, 1370 m, 27.vi.2006, Z. Tokár leg. (L. Kaila prep. 5593, DNA sample 22163 Lepid. Phyl; Coll. Tokár).

Diagnosis. *E. platamodes* is more broad-winged than any other species in the whole *E. dispilella* group. As such, it externally rather resembles several species in the *E. catalana* and *E. pollutella* species groups whose genitalia, however, are readily distinguished from any species in the *E. dispilella* group (cf. Kaila 2011b,c). The male genitalia of *E. platamodes* closely resemble those of *E. bimaculata* and *E. semnani,* by having a long and acute-tipped juxta lobe. See the key as well as the diagnosis of *E. bimaculata* for identification of these species by male genitalia.

Molecular characterization. One specimen was available for molecular study. Of the species included the closest taxon in terms of similarity of barcodes is *E. acutella* (distance 3.84 %).

Description. Forewing length 4 mm. Labial palpus slightly upcurved, length a little less than diameter of head, chalky white above, fuscous grey below. Head, neck tuft and thorax white with grey areas, scape and pedicel of antenna white; scape with distinctive pecten formed of elongate, white scales; flagellum dark grey. Fore- and midleg brownish grey, laterally with white scales, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing unicolorous, chalky white, with concolorous fringe. Underside of forewing dark grey, in basal third two pale longitudinal lines, fringe white. Costal side of hindwing pale brownish grey, hindwing otherwise translucent, pale grey with concolorous fringe. Underside of hindwing white, translucent, on costal side scattered with brown scales; fringe white.

Male genitalia. Uncus lobe rounded, sparsely covered by setae along distal and distolateral margins, lobes separated by narrow incision, depth of incision between them 1/3 the length of uncus. Spinose knob of gnathos elongate, as wide as uncus lobe. Valva 4x as long as wide in the widest point a little basal to middle, nearly straight, distal half slightly narrower than basal half. Cucullus indistinctly delineated, distally slightly produced towards sacculus. Digitate process 0.25x as long as valva, tongue-shaped, distal 2/3 with setae. Juxta lobe as long as digitate process, distally markedly produced, sharp-tipped, with a few setae distally; indistinct oblique fold from middle of distal margin; median margin somewhat convex, joining distal margin at acute angle; distal margin straight, somewhat truncate between fold and median margin, joining lateral margin at very obtuse angle; lateral margin concave; median plate of juxta posteriorly with dorsally projected curved lobe. Vinculum broad, u-shaped. Phallus 0.7–0.8x as long as valva, slightly bent, about 9x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one blunt tooth.

Female. Unknown.

Etymology. The name *platamodes* is a Greek word, meaning ‘broad’. This refers to the forewing shape which is broader than in other species of the *E. subula* species complex.

***Elachista acutella* Kaila, 2003**
Figs. 19, 43

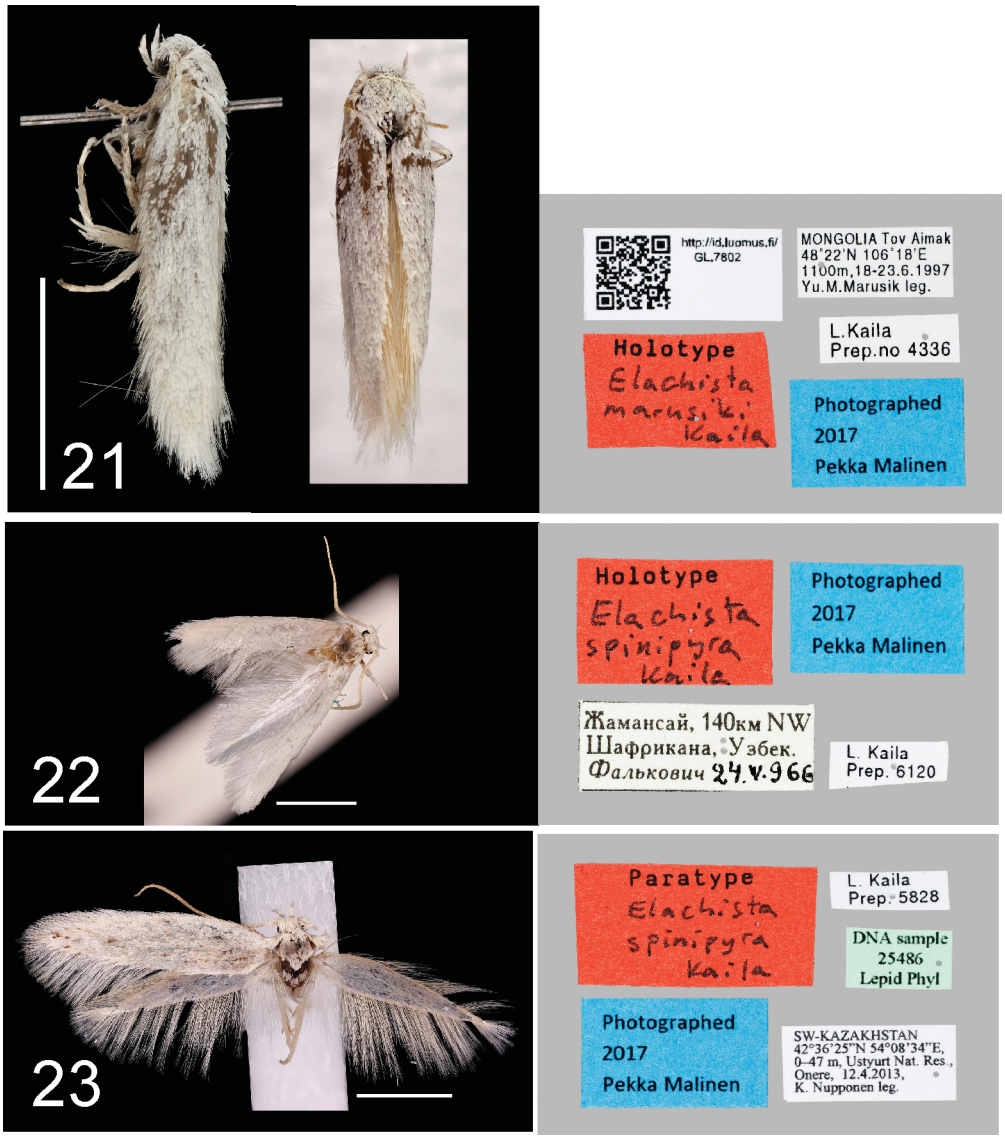
Elachista acutella Kaila, in Kaila *et al*.: 2003: 80.

Material examined: Type material: holotype ♂: Russia, S. Ural, 51°23’N 56°49’E, 130–340 m, Orenburg distr., 6 km W Donskoje village, Mt. Verbljushka, 10.vi.1998, T. & K. Nupponen leg. (L. Kaila prep. 3390; Coll. Nupponen). Paratypes (3 ♂): the same locality, 10.–12.VI.1998, 1 ♂, J. Junnilainen leg. (Coll. Junnilainen), 2 ♂, T. & K. Nupponen leg. (Coll. Nupponen, MZH). Other material: **Kazakhstan:** 48°38’N 57°54’E, 200 m, Kumzhargan sands by Emba River, 5.vi.2011, 2 ♂, K. Nupponen leg. (DNA sample 22509 Lepid. Phyl.; Coll. Nupponen, MZH).

Diagnosis. *E. acutella* is a unicolorous white species. It is distinguishable from other species of the *E. subula* species complex, apart from *E. cultella*, by the long uncus lobes which are 2x as long as wide, as well as the medially produced juxta lobes whose median and distal margins are joined at an acute angle. The genitalia of *E.*

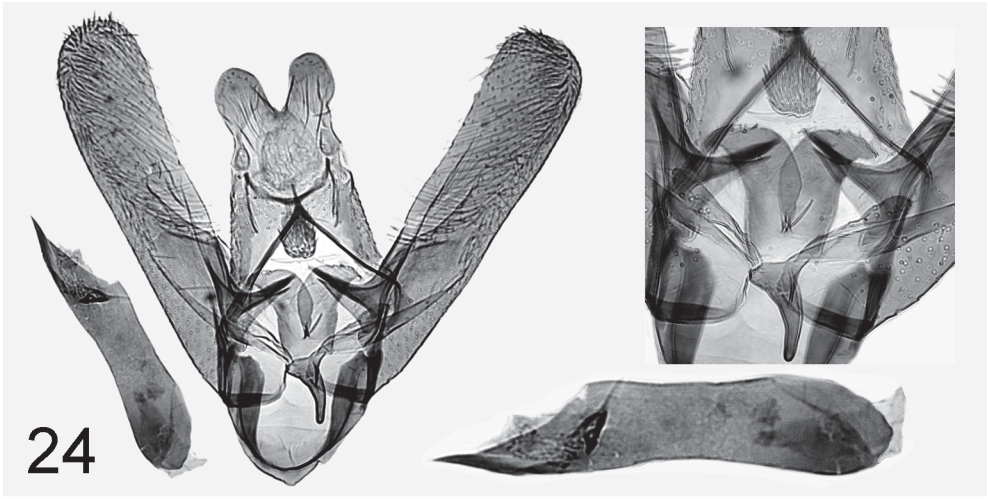
acutella could be characterized as being prolonged in every direction as compared to *E. cultella*; thus ratios of relative sizes between different parts do not markedly differ but the general appearance, best visible in images, does. The phallus of *E. acutella* is narrow, its length approximately 20x its width at its median area, whereas in *E. cultella* the length of phallus is approximately 9x its width at its median area. The acute shape of the juxta lobes in *E. acutella*, as compared to other species, also readily distinguishes *E. acutella* from *E. cultella*.

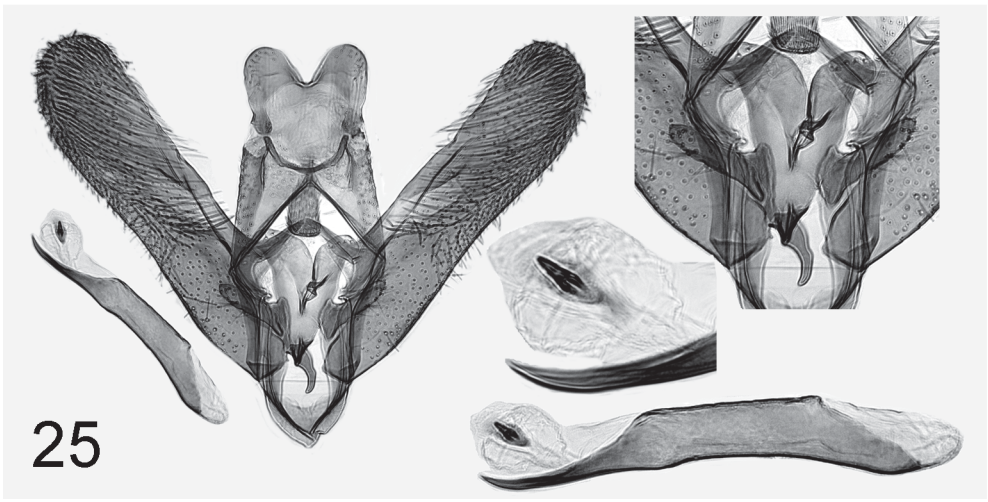
Molecular characterization. There was no intraspecific variation among the three included specimens. Of the species included the closest taxon in terms of similarity of barcodes is *E. scalpra* (distance 3.61 %).



FIGURES 21–23. Adults of *Elachista* spp. Scale 2 mm. 21. *E. marusiki* Kaila, **sp. nov.**, ♂ holotype. Left: lateral view, middle: dorsal view. 22. *E. spinipyra* Kaila, **sp. nov.**, ♂ holotype. 23. *E. spinipyra* Kaila, **sp. nov.**, ♀ paratype (SW Kazakhstan, Ustyurt Nat. Res.).

Redescription. Forewing length 5 mm. Labial palpus straight or upcurved, white, length equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white; scape with distinctive pecten formed of elongate, white scales; flagellum brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing chalky white, basal third of costa narrowly dark grey. Indistinctly developed plical and discal spots, if present, formed of a few dark grey scales; fringe concolorous with forewing ground colour. Underside of forewing dark grey, in basal third two broad, pale longitudinal lines, fringe white. Underside of hindwing grey, translucent, except on costal side where it is dark grey; fringe pale grey.





FIGURES 24–25. Male genitalia of *Elachista subula* Parenti. 24. Holotype (U. Parenti prep. 2133). Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Right bottom: phallus as enlarged. 25. Mongolia, Tov Aimak (L. Kaila prep. 3945). Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged.

Male genitalia. Uncus lobe elongate, twice as long as broad, sparsely covered by setae distally, lobes separated by distinct U-shaped incision, depth of incision half of the length of uncus. Spinose knob of gnathos basally narrow, oval-shaped. Valva elongate and straight, 6–6.5x as long as wide in the widest point a little basal to middle; Cucullus indistinctly delineated, elongate, distally somewhat tapered, apically rounded. Digitate process narrow, parallel-sided, 0.25x as long as valva, distal 2/3 with setae. Juxta lobe somewhat shorter than digitate process, distally produced and with a few setae at apex; median margin straight, joining the straight distal margin at an acute angle. Median plate of juxta narrowed posteriorly, forming dorsally projected lobe. Vinculum broad, U-shaped. Phallus 0.7–0.8x as long as valva, slightly bent, about 10x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate which one blunt tooth.

Female. Unknown.

Biology. The species inhabits xerothermic slopes in calcareous and sandy steppes.

Distribution. W. Kazakhstan, Russia (S. Ural).

Etymology. The name *acutella* was originally derived from two traits: the distally acute-shaped juxta lobes, as well as the acute-tipped apex of the phallus.

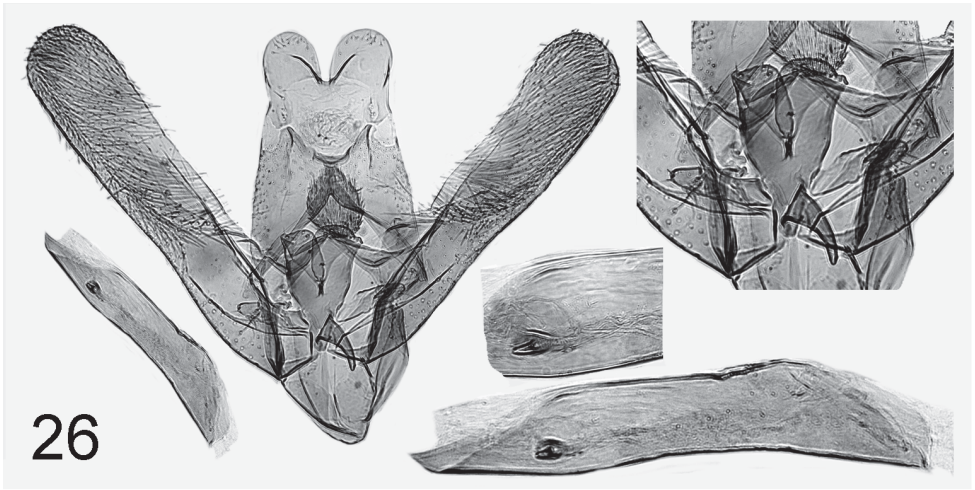
***Elachista cultella* Kaila, sp. nov.**
Figs. 20, 44, 45

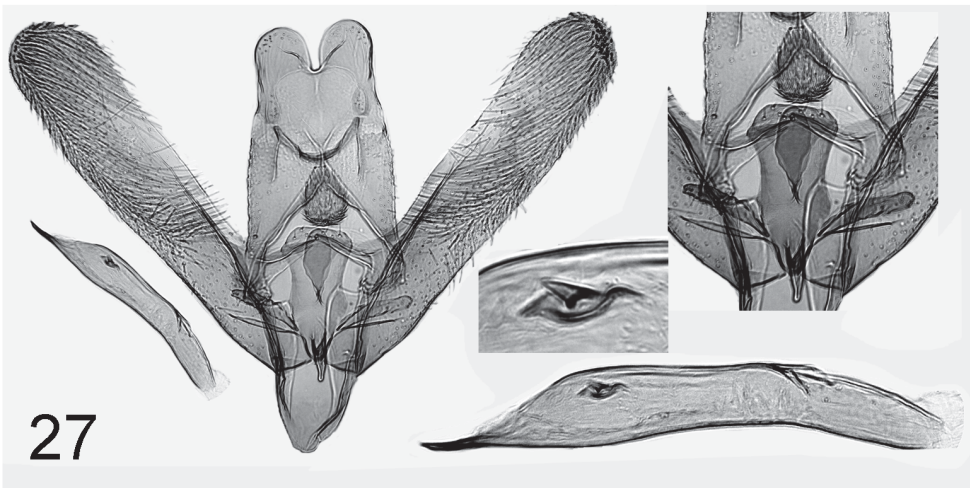
Material examined. Type material: holotype ♂: **Mongolia:** 43°21'N 103°11'E, 1700 m, Omnogov Aimak, Bayandalai, Somon Zoolen uul, 27.–30.v.1997, Yu. Marusik leg. (L. Kaila prep. 4328; MZH). Paratypes (5 ♂): 3 ♂ with the same collection data as in the holotype (L. Kaila prep. 3940, 4332, 4333; MZH); Mongolia, 48°22'N 106°18'E, 1100 m, Tov Aimak, 18.–23.vi.1997, 2 ♂, Yu. Marusik leg. (L. Kaila prep. 4334, 4335; MZH).

Diagnosis. *E. cultella* is a small species with creamy white forewing ground colour with pronounced discal and plical spots and a few scattered grey scales in distal third of forewing. The large uncus lobes distinguish this species from most others. This trait somewhat resembles *E. acutella*, in which the uncus lobes are much narrower. The separation of these species is further explained in the diagnosis of *E. acutella.*

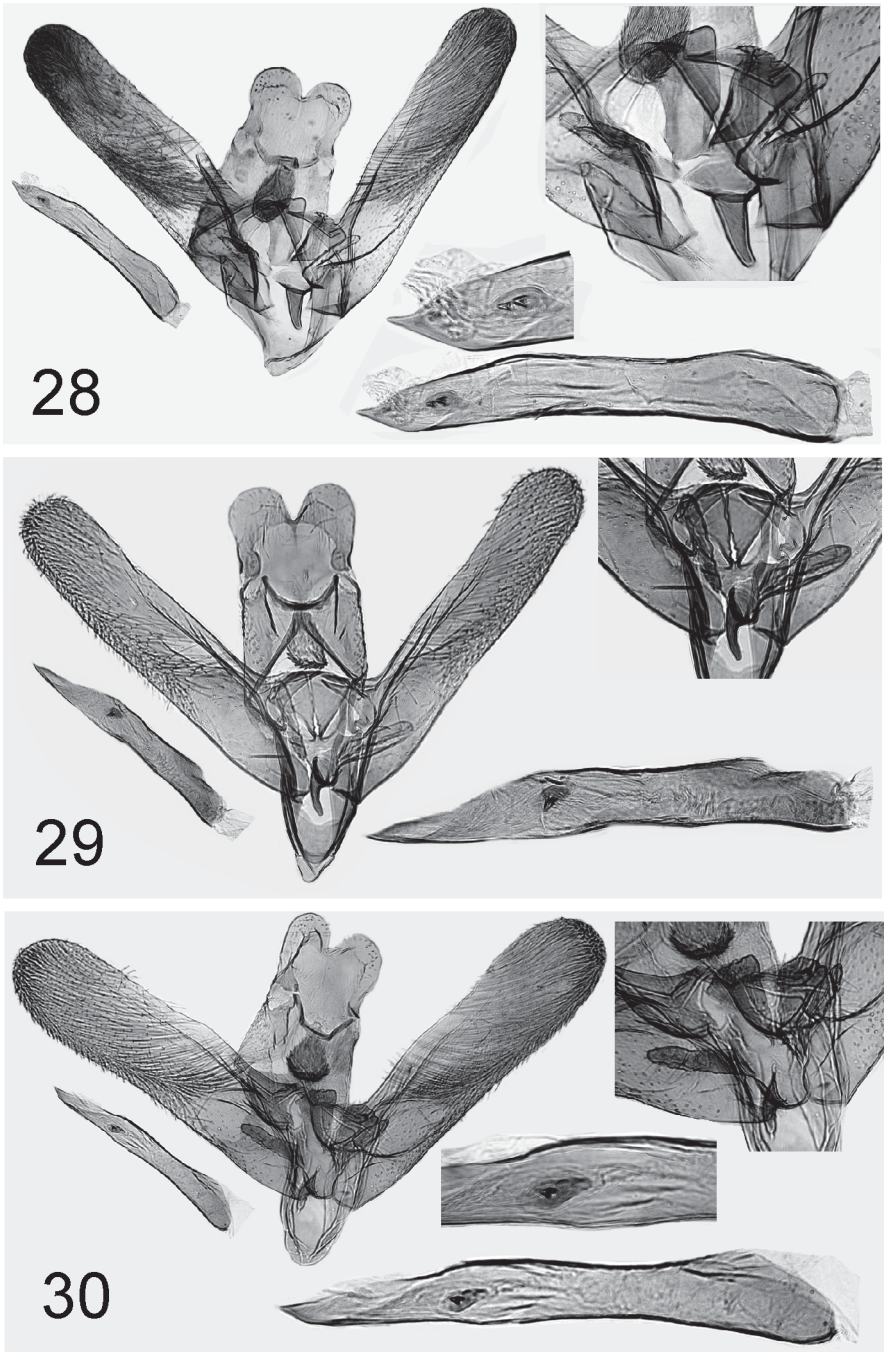
Molecular characterization. No material was available for genetic study.

Description. Forewing length 4 mm. Labial palpus straight or upcurved, white, length nearly equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white; scape with distinctive pecten formed of elongate, white scales; flagellum brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing creamy white, basal third of costa narrowly dark grey. Plical and discal spots distinctive, rounded, dark grey. Some scattered grey scales on distal third of wing. Fringe concolorous with forewing ground colour. Underside of forewing grey, fringe along costa and apex yellow, otherwise pale grey. Hindwing translucent, pale grey with concolorous fringe. Underside grey on costal half, otherwise translucent, pale grey with concolorous fringe.





FIGURES 26–27. Male genitalia of *E. cisoria* Kaila, **sp. nov.** Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 26. Holotype (J. Tabell prep. 4635). 27. Paratype (Spain: Aragon, Nr. Teruel; L. Kaila prep. 4703).



FIGURES 28–30. Male genitalia of *E. drepanella* Kaila, **sp. nov.**. Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged [not included in Fig. 29]. Right bottom: phallus as enlarged. 28. Holotype (L. Kaila prep. 1680). 29. Paratype (Russia: Altai: Kuray; L. Kaila prep. 3954). 30. Paratype (Kazakhstan: Muyunkum sands; L. Kaila prep. 5918).

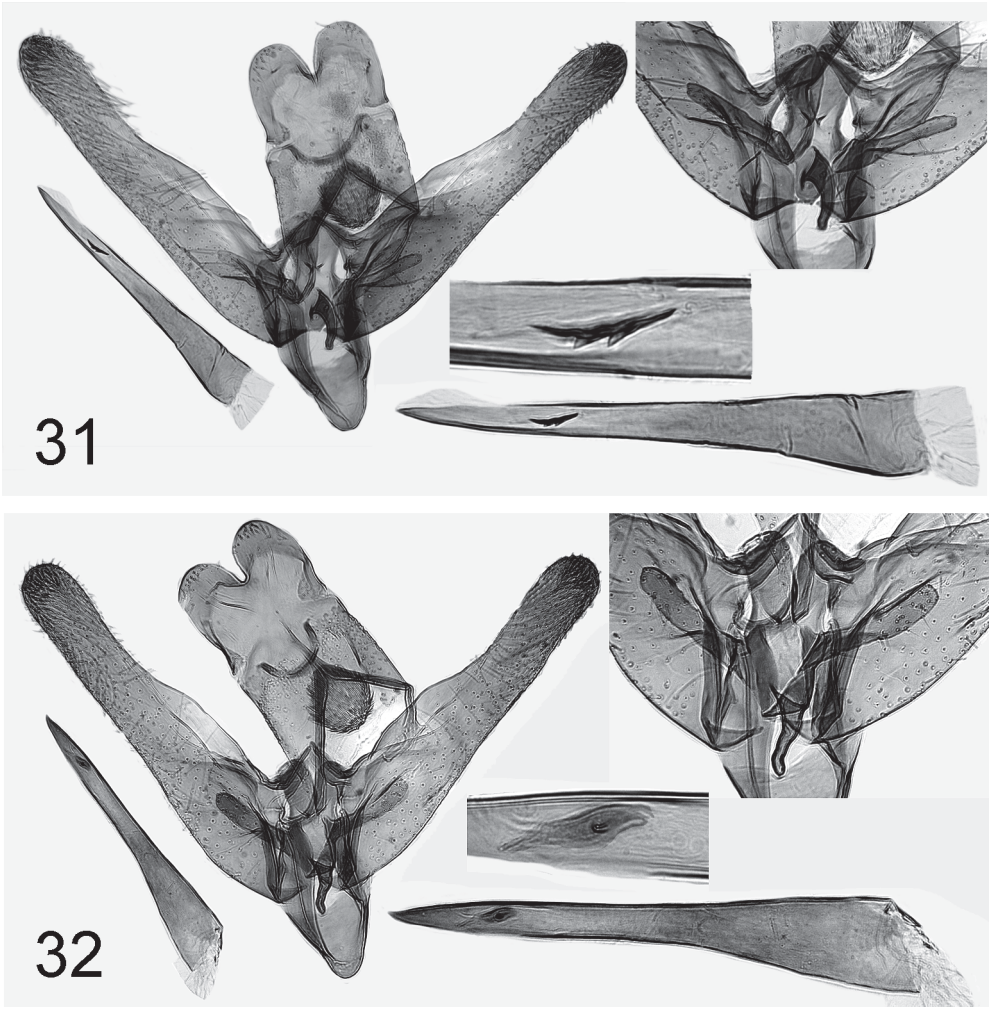
Male genitalia. Uncus lobe large, a little longer than wide, sparsely covered by setae along distal and lateral margins, lobes separated by V-shaped incision, depth of incision half of the length of uncus. Spinose knob of gnathos rounded. Valva narrow, elongate and straight, 6x as long as wide in the widest point a little basal to middle; cucullus indistinctly delineated, elongate, distally somewhat broadened, apically rounded. Digitate process narrow, parallel-sided, 0.2x as long as valva, distal 2/3 with setae. Juxta lobe somewhat longer than digitate process, median margin nearly straight, meeting distal margin at a right angle; distal margin with a few setae in its median part. Median plate of juxta narrowed posteriorly, with dorsally projected lobe. Vinculum broad, U-shaped. Phallus 0.7x as long as valva, slightly bent, 7–8x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one blunt tooth.

Female. Unknown.

Biology. Unknown. The specimens have been collected at altitudes ranging from 1100 to 1700 m.

Distribution. Mongolia.

Etymology. The name is derived from the Latin word *cultellum*, a small knife. This refers to the acute apex of the phallus.



FIGURES 31–32. Male genitalia of *E. ameteria* Kaila, **sp. nov.** Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 31. Holotype (L. Kaila prep. 6070). 32. Paratype (Kazakhstan: nr. Emba village; L. Kaila prep. 6074).

***Elachista marusiki* Kaila, sp. nov.**

Figs. 21, 46

Material examined. Type material: holotype ♂: **Mongolia:** 48°22'N 106°18'E, 1100 m, Tov Aimak, 18.–23.vi.1997, Yu. Marusik leg. (L. Kaila prep. 4336; MZH).

Diagnosis. *E. marusiki* is a small species characterized by a large gnathos similar to *E. scalpra*, a long and narrow digitate process and especially the long phallus, length of which is over 0.8 the length of the valva. Nearly equally long phallus only occurs in *E. acutella* whose uncus lobes are significantly longer and narrower than in *E. marusiki.*

Molecular characterization. No material was available for genetic study.

Description. Forewing length 3 mm. Labial palpus upcurved, white, length nearly equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white; scape with distinctive pecten formed of elongate, white scales; flagellum brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing chalky

white, basal third of costa narrowly dark grey, no other pattern visible; fringe conclorous with forewing. Underside of forewing grey, fringe scales on apex basally yellow, distally white, fringe otherwise white. Hindwing translucent, pale grey with concolorous fringe. Underside grey on costal half, otherwise translucent, pale grey with concolorous fringe.

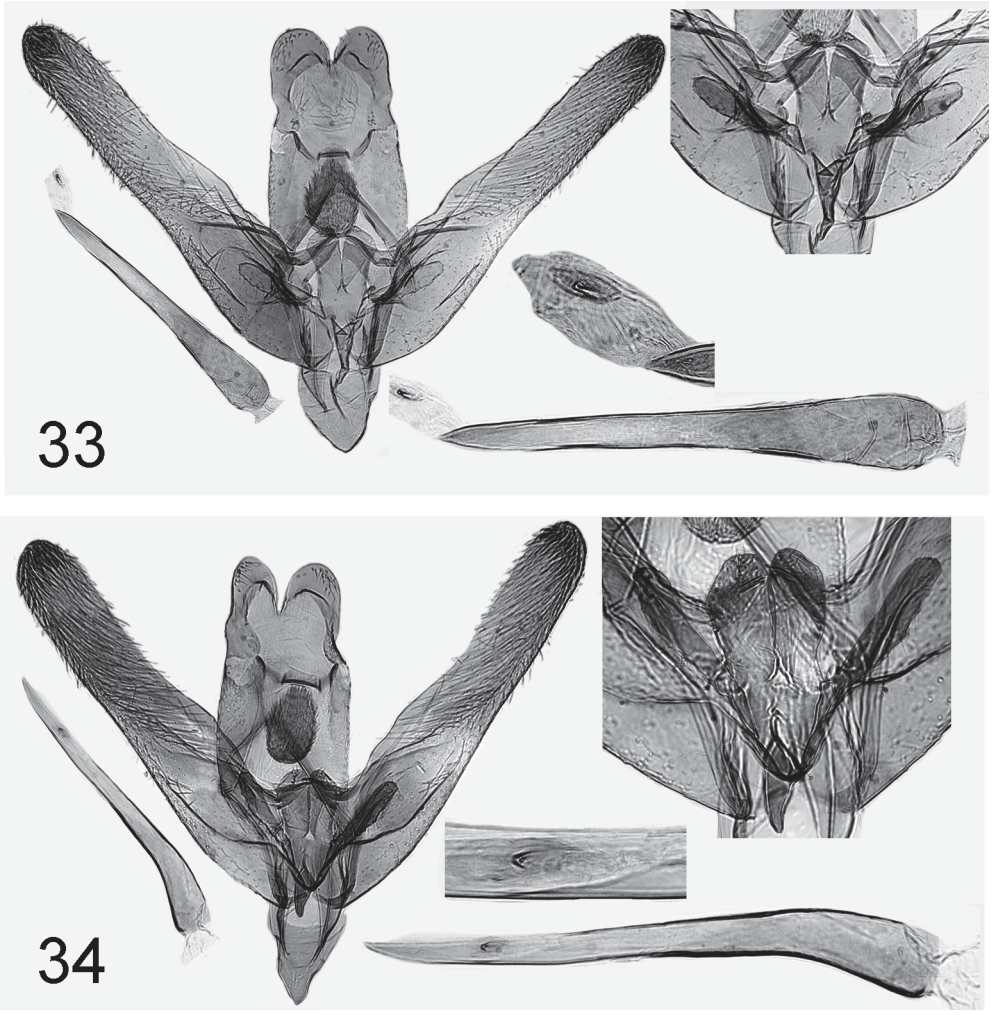
Male genitalia. Uncus lobe a little broader than long, sparsely covered by setae along distal margin, lobes separated by V-shaped incision, depth of incision 1/4 of the length of uncus. Spinose knob of gnathos large, oval-shaped; its width equal to width of uncus lobe. Valva elongate and straight, 4.5x as long as wide in the widest point a little basal to middle; cucullus indistinctly delineated, distally rounded. Digitate process narrow, parallel-sided, 0.25x as long as valva, distal 2/3 with setae. Juxta lobe as long as digitate process, medially produced, with a few setae at its longest point; median margin basally a little convex and rugose, otherwise straight; distal margin nearly straight. Median plate of juxta narrowed posteriorly, with dorsally projected lobe. Vinculum narrow, V-shaped. Phallus over 0.8x as long as valva, slightly bent, slender, 13x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate with one blunt tooth.

Female. Unknown.

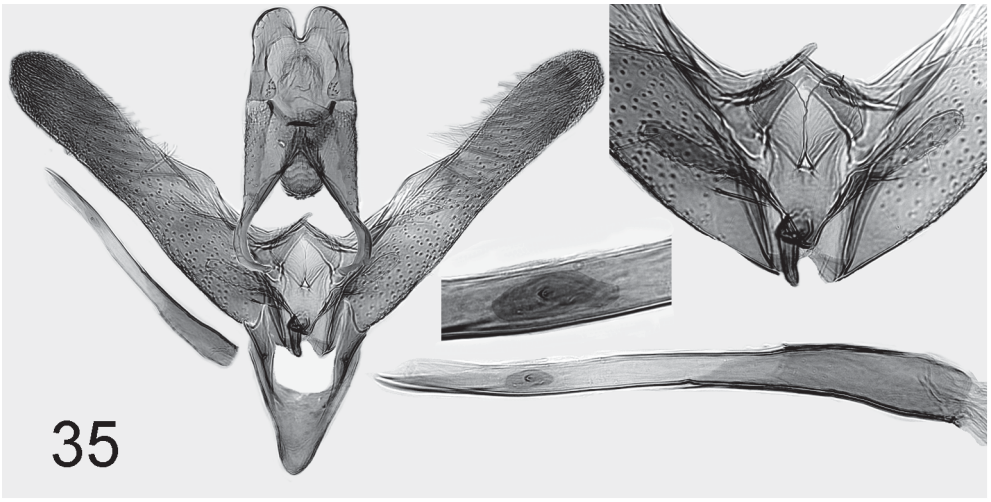
Biology. Unknown. The specimens have been collected at altitude of 1100 m.

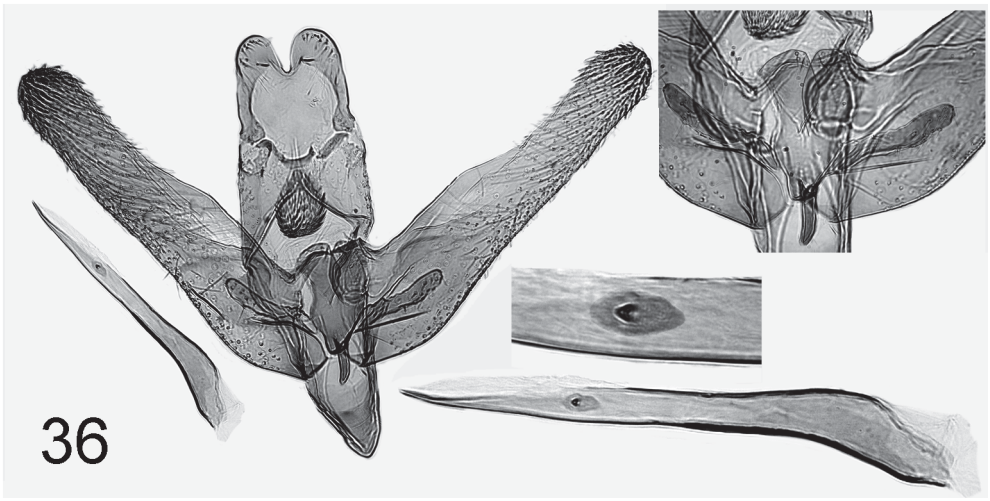
Distribution. Mongolia.

Etymology. *E. marusiki* is named after Yuri Marusik, a Russian arachnologist who collected the single known specimen.



FIGURES 33–34. Male genitalia of *E. scalpra* Kaila, **sp. nov.** Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 33. Holotype (J. Tabell prep. 4482). 34. Paratype (Turkey: nr. Yesilhisar; L. Kaila prep. 5866).



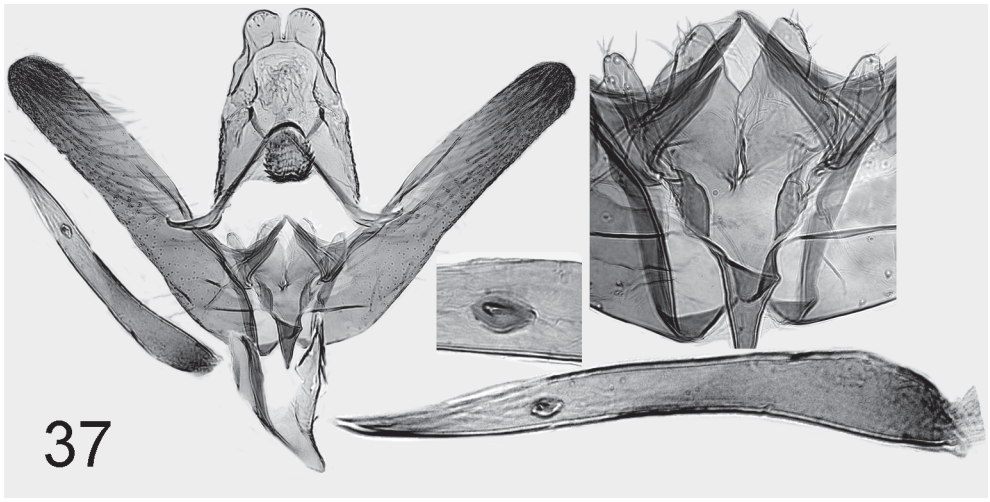


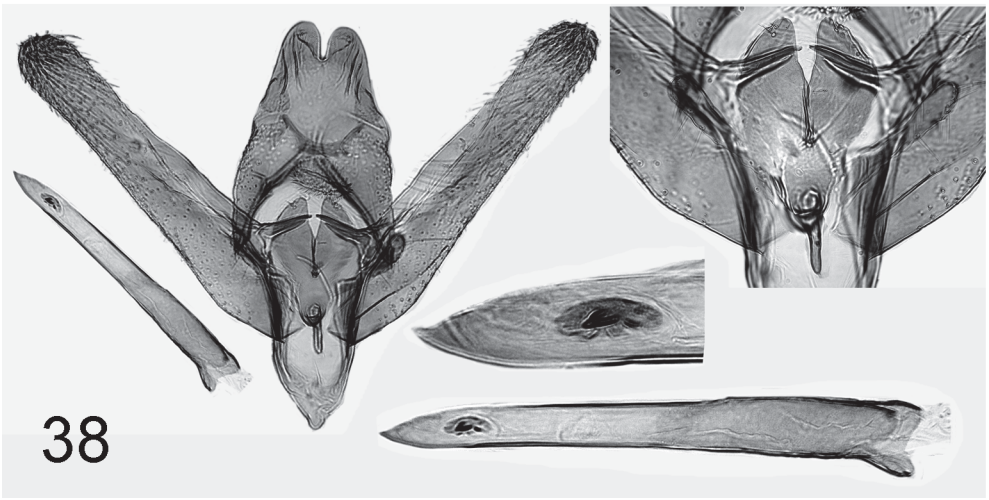
FIGURES 35–36. Male genitalia of *E. mus* Parenti. Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 35. Holotype (U. Parenti prep. 1006). 36. Kazakhstan: Emba river; L. Kaila prep. 6144.

Elachista spinipyra **Kaila, sp. nov.**
Figs. 22, 23, 47, 48

Material examined. Type material: holotype ♂: Uzbekistan, Shamansay, 140 km NW Šhafrnikan, 24.v.1966, Falkovitsh leg. (L. Kaila prep. 6120; ZIN). Paratypes (9 ♂): 2 ♂ with the same collecting data as the holotype except the dates 12.v.1966 and 12.v.1966 (L. Kaila prep. 5852, 5861; MZH, ZIN). **Kazakhstan**: 42°36’25’’N 54°08’34’’W, 0–47 m, Ustyurt Nat. res., Onere, 12.iv.2913, 1 ♂, K. Nupponen leg. (L. Kaila prep. 5858, DNA sample 25486 Lepid. Phyl.; Coll. Nupponen); **Turkmenistan:** Repetek, 21.iv.1970, 23.iv.1970, 2 ♂, Guleva leg., na svjet [ad luc.] (Kaila prep. 5856, 5857; ZIN); [SE. Turkmenistan] [S.] hrebet Kugitan, Bazar-depe, 1730 m, 10.–15.v.1991, 3 ♂, V. Dubatolov & Zhinsenko leg. (L. Kaila prep. 4024, 4789, 4814; SZMN); **Uzbekistan:** 60 km Juz. [S] Uz-Kuduk, Kyzylkum [desert], 6.v.1966, 1 ♂, Pastuhov leg. (L. Kaila prep. 5885; ZIN).

Diagnosis. *E. spinipyra* is a creamy white species often with irregularly and sparsely scattered pale grey scales on the forewing. Its valva is relatively short as compared to other parts of genitalia; this feature is easier to see from image than as numerical ratios. The gnathos is broad, rounded or somewhat drop-shaped; this distinguishes *E. spinipyra* from most other species. The cornutus contains a larger and stouter spine than in other species; there is, however, some variation and possibly overlap with, e.g., *E. mus.* The general dimensions of *E. mus* are more prolonged (difficult to express in ratios, easier to decipher in figures) and its juxta lobes are distally rounded. These traits, as well as the forewing colour, distinguish these species.



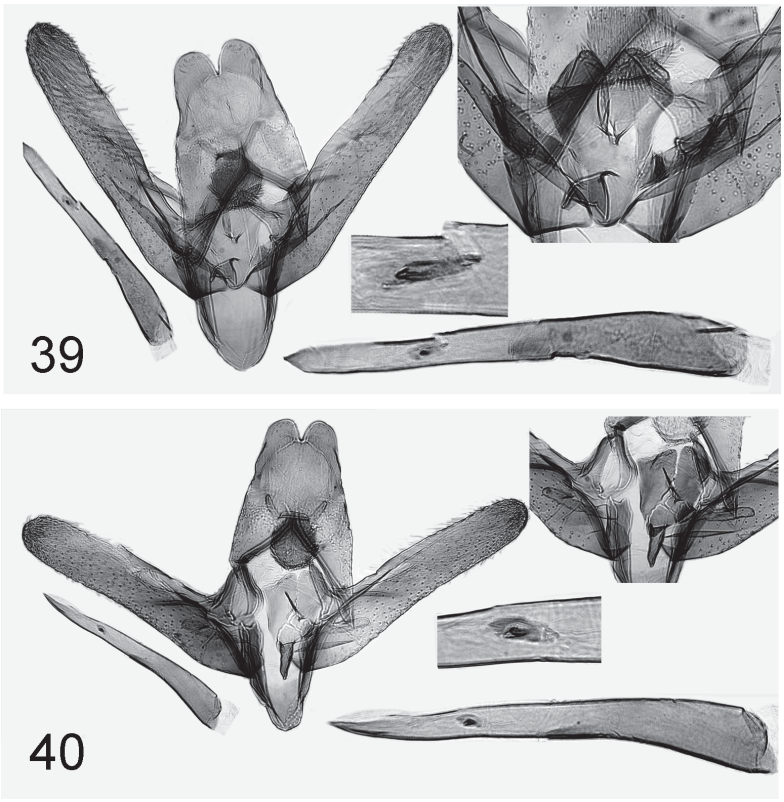


FIGURES 37–38. Male genitalia of *E. bimaculata* Parenti. Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 37. Holotype (U. Parenti prep. 937). 38. Kyrgyzstan: Alai mts, Tengiz-Bai pass gate; L. Kaila prep. 5538.

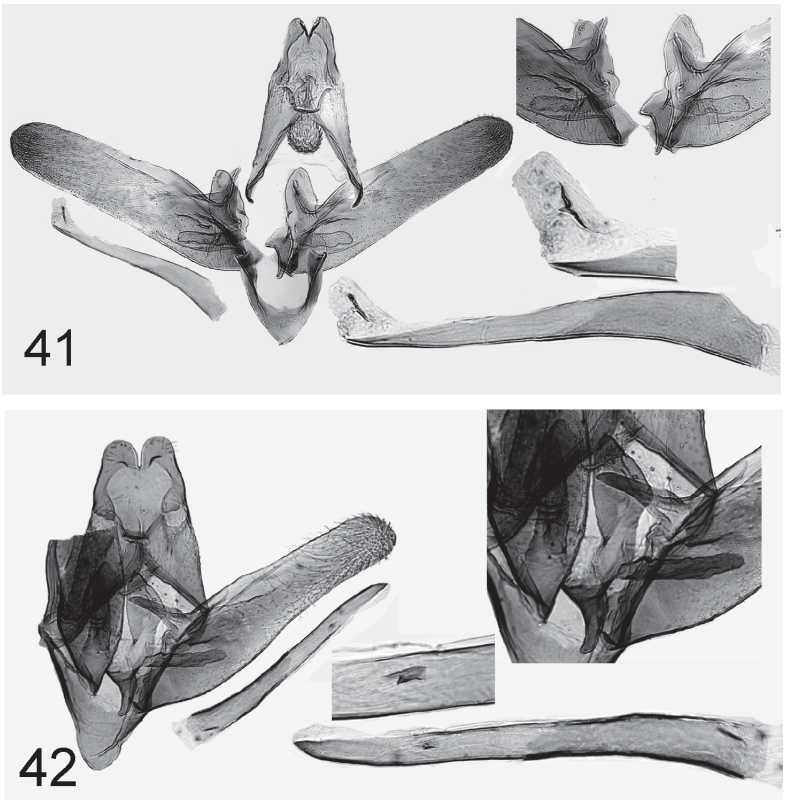
Molecular characterization. One specimen was available for genetic study. Of the species included the closest taxon in terms of similarity of barcodes is *E. drepanella* (distance 4.47 %).

Description. Forewing length 4–5 mm. Labial palpus upcurved, white, length nearly equal to diameter of head. Head, neck tuft, thorax, scape and pedicel of antenna white; scape somewhat flattened, cap-like, and with distinctive pecten formed of elongate, white scales; flagellum pale brown. Fore- and midleg inwardly dark grey, outwardly white, tarsal articles distally pale; hindleg pale grey, spurs nearly black, tibia and tarsus above grey with distally pale tibia and tarsal articles. Forewing creamy white, basal third of costa narrowly dark grey, unicolorous or with varying amount of grey irroration. Fringe pale yellow or grey along costa up to apex, otherwise white or very pale grey. Underside of forewing grey, fringe pale yellow. Hindwing translucent, very pale grey with concolorous fringe. Underside ochreous grey on costal half, otherwise translucent, pale grey. Fringe pale grey.

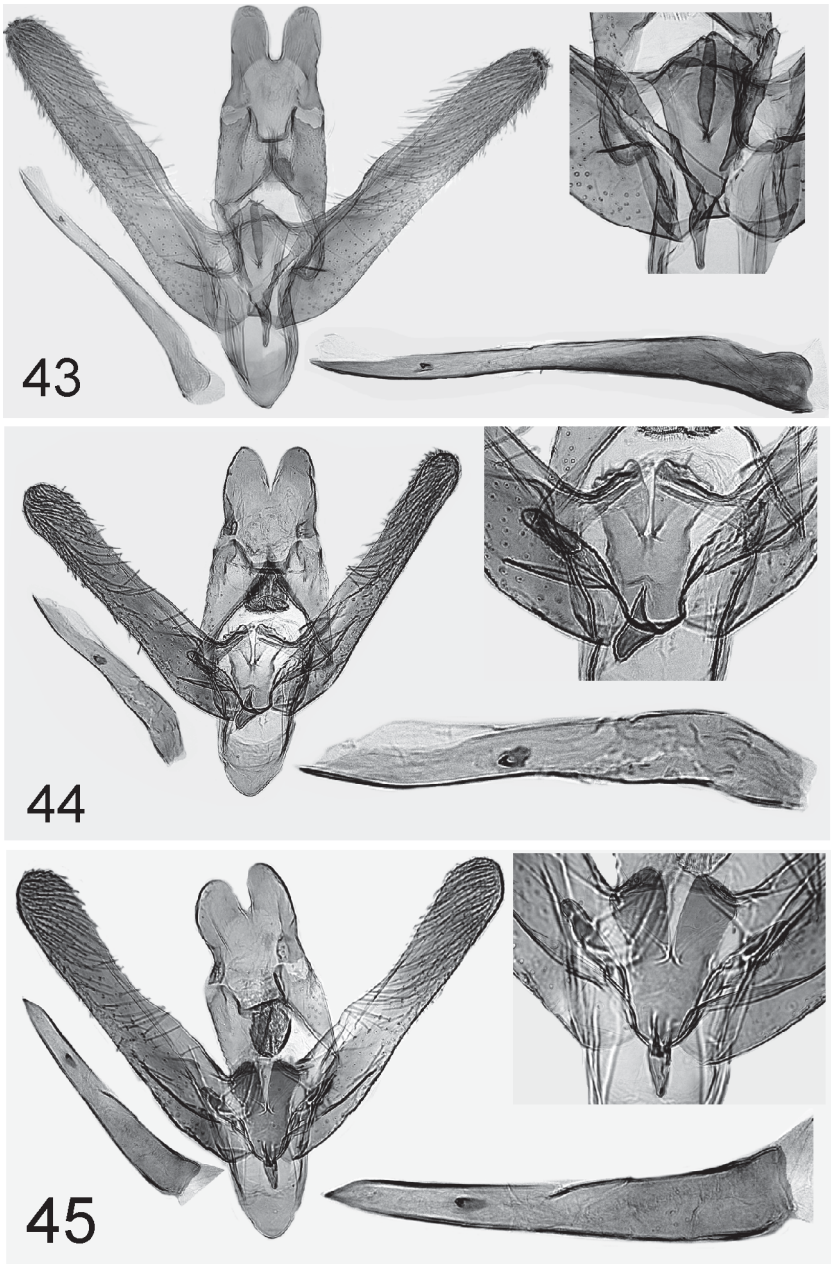
Male genitalia. Uncus lobe as long as broad, sparsely covered by setae along distal and distolateral margins, incision separating uncus lobes 1/3 of length of uncus. Spinose knob of gnathos broad, rounded or somewhat drop-shaped. Valva nearly straight, 5.5x as long as wide in the widest point a little basal to middle; cucullus indistinctly delineated, distally rounded. Digitate process parallel-sided, 0.2x as long as valva, distal 2/3 with setae. Juxta lobe somewhat longer than digitate process, median margin nearly straight, distal margin convex, with a few setae at median 1/3. Median plate of juxta narrowed posteriorly, with dorsally projected lobe. Vinculum short, abruptly tapered. Phallus 0.65x as long as valva, slightly bent, 8–9x as long as broad at its broadest place near base, tapered into sclerotized, acute-tipped apex. Vesica with cornutus that consists of oval, indistinctly delineated, weakly sclerotized elongate plate that distally is folded to form one distinct, blunt or sharp tooth.



FIGURES 39–40. Male genitalia of *E. perona* Kaila, **sp. nov.** Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 39. Holotype (L. Kaila prep. 492). 40. Paratype (Kazakhstan: Dzhambulskaya oblast; L. Kaila prep. 391).



FIGURES 41–42. Male genitalia of *Elachista* spp. Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Middle: cornutus as enlarged. Right bottom: phallus as enlarged. 41. *E. semnani* Parenti, holotype (U. Parenti prep. 1043). 42. *E. platamodes* Kaila, **sp. nov.** holotype, L. Kaila prep. 5593.



FIGURES 43–45. Male genitalia of *Elachista* spp. Left: general image of genitalia, phallus in same scale. Right top: juxta and digitate process. Right bottom: phallus as enlarged. 43. *E. acutella* Kaila. Holotype (L. Kaila prep. 3990). 44. *E. cultella* Kaila, **sp. nov.** Holotype (L. Kaila prep. 4328). 45. *E. cultella* Kaila, **sp. nov.** paratype (Mongolia: Tov Aimak; L. Kaila prep. 4334).

Female. Unknown.

Biology. The species inhabits Central Asian deserts. The habitat in Onere (SW. Kazakhstan) is a gypsum desert. The moth flies at dusk and comes to UV light.

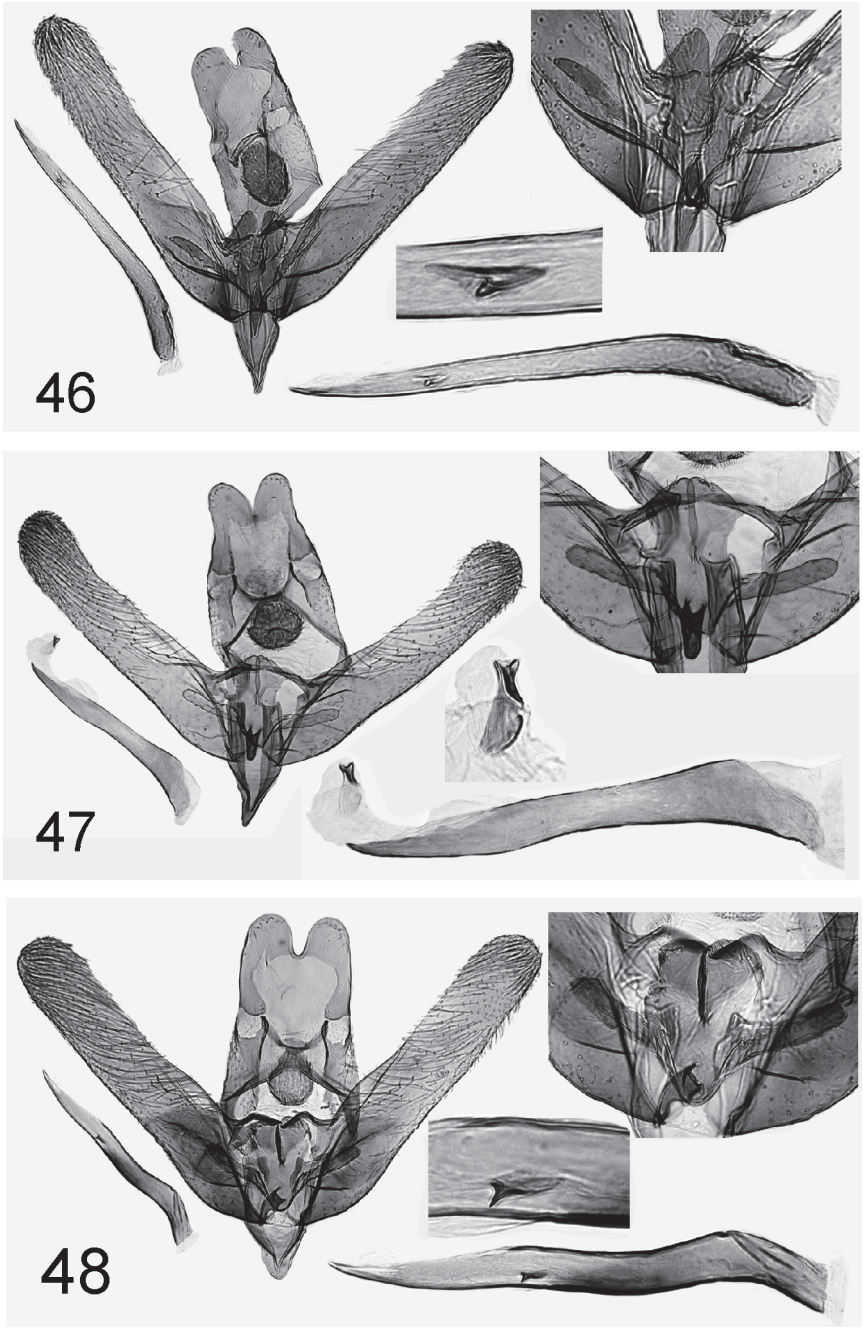
Distribution. SE. Kazakhstan, Turkmenistan, Uzbekistan.

Etymology. The name is derived from the Latin word *spina*, thorn, and the Greek word *pyra*, meaning 'grain'. This refers to the presence of a thorn-shaped tooth on the cornutus ("grain") in the vesica.

Discussion

The *Elachista dispilella* group has so far appeared to be predominantly west-Palearctic. Not only re-consideration of the status of many European nominal species, but also exploration of little known regions, like the present

contribution that largely considers Central Asian taxa suggest that the situation is not quite so. Apparently, different subordinate species complexes have different areas of their highest diversity. The *E. dispilella* and *E. dispunctella* species complexes seem to be most species rich in Europe, the latter in Spain in particular, with only a few species extending their distribution range to Siberia and/or Central Asia. The *E. subula* species complex, instead, appears to be most species rich in Central Asia, with only two species currently recorded in Europe.

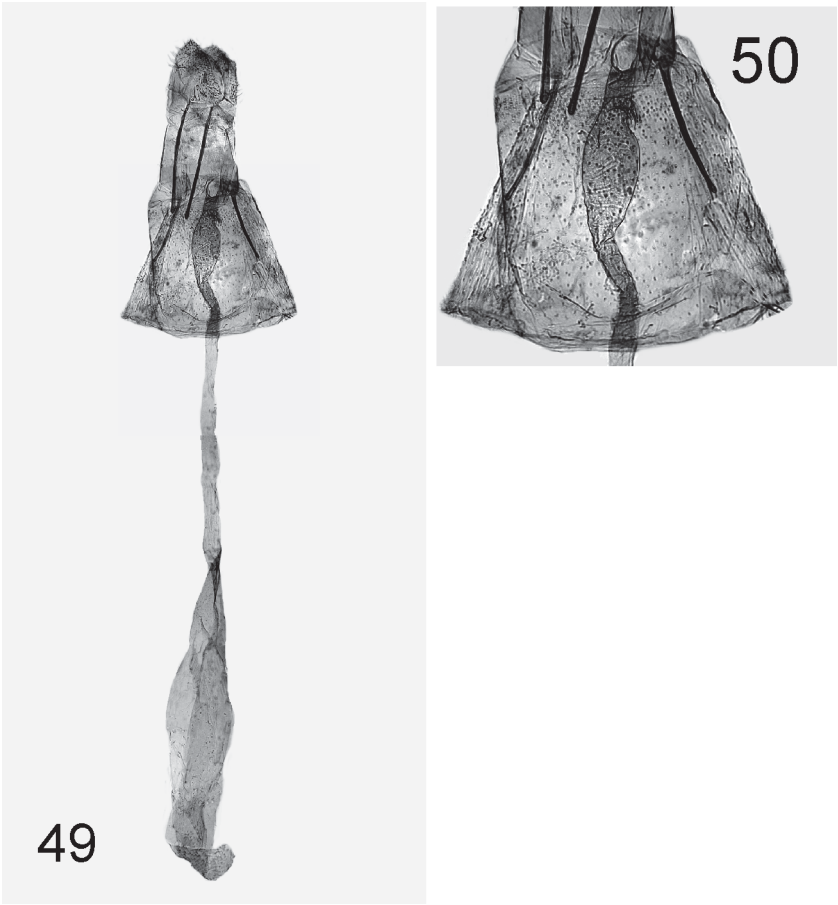


FIGURES 46–48. Male genitalia of *Elachista* spp. Left: general image of genitalia, phallus in same scale. Middle: cornutus as enlarged. Right top: juxta and digitate process. Right bottom: phallus as enlarged. 46. *E. marusiki* Kaila, **sp. nov.** Holotype (L. Kaila prep. 4336). 47. *E. spinipyra* Kaila, **sp. nov.** holotype (L. Kaila prep. 6120). 48. *E. spinipyra* Kaila, **sp. nov.** paratype (Turkmenistan: Repetek; L. Kaila prep. 4789).

The recent change in the paradigm of species concept within the *E. dispilella* group from typological with no intraspecific variation allowed (Traugott-Olsen 1988, 1990, 1992) to evidence-based (Albrecht & Kaila 1997; Kaila 2015a; Kaila *et al.* 2015) has significantly altered the number of species now considered as valid. Traugott-Olsen (1988, 1990, 1992) recognized 80 species in those species complexes of the *E. dispilella* group that he treated. Kaila (2015a) and Kaila *et al.* (2015) synonymized 49 of these species. Suggestion of this considerably

smaller number of valid species was supported by a geometric morphology-based analysis of wing venation, a character set that Traugott-Olsen extensively used when forming his species hypotheses (Albrecht & Kaila 1997); analysis of full-length DNA barcodes of fresh specimens as combined with usually shorter ones obtained from primary types of the nominal species (Mutanen *et al.* 2015); and morphological scrutiny of a considerable amount of additional material by Kaila (Kaila 2015a; Kaila *et al.* 2015). Only 31, i.e. 39%, of these species are currently considered valid. Such a change is significant even in global scale regarding species richness of *Elachista*.

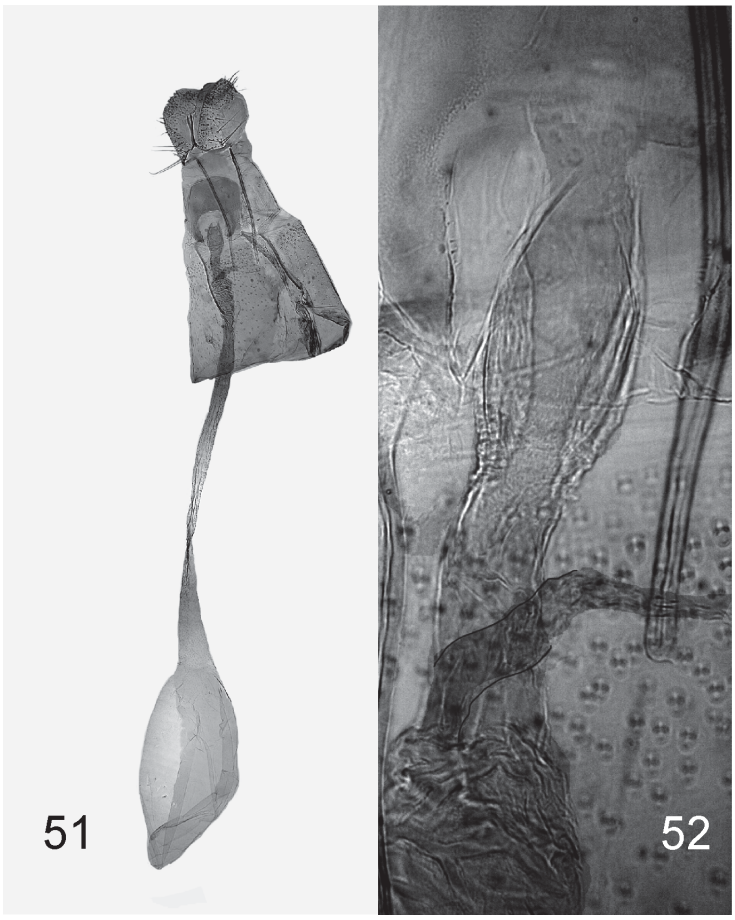
Kaila (2011a) suggested a total of approximately 700 valid *Elachista* species world-wide, 182 of which belonged to the subgenus *Aphelosetia.* The reduction in number of recognized *Aphelosetia* species decreased by 17 %, equivalent to a 7 % reduction of the global species number for the entire genus *Elachista*. However, as a result of recent studies (Kaila *et al.* 2015; Mutanen *et al.* 2013, Kaila 2012, 2015a,b, 2017, Kaila & Nupponen 2017, Sruoga *et al.* 2017) and the present work, the number of *Elachista* species worldwide has grown so that it is once again close to Kaila's (2011a) estimation. Unpublished data (L. Kaila, pers. obs.; J. De Prins; V. Sruoga; personal communications) suggest the existence of even many more species.



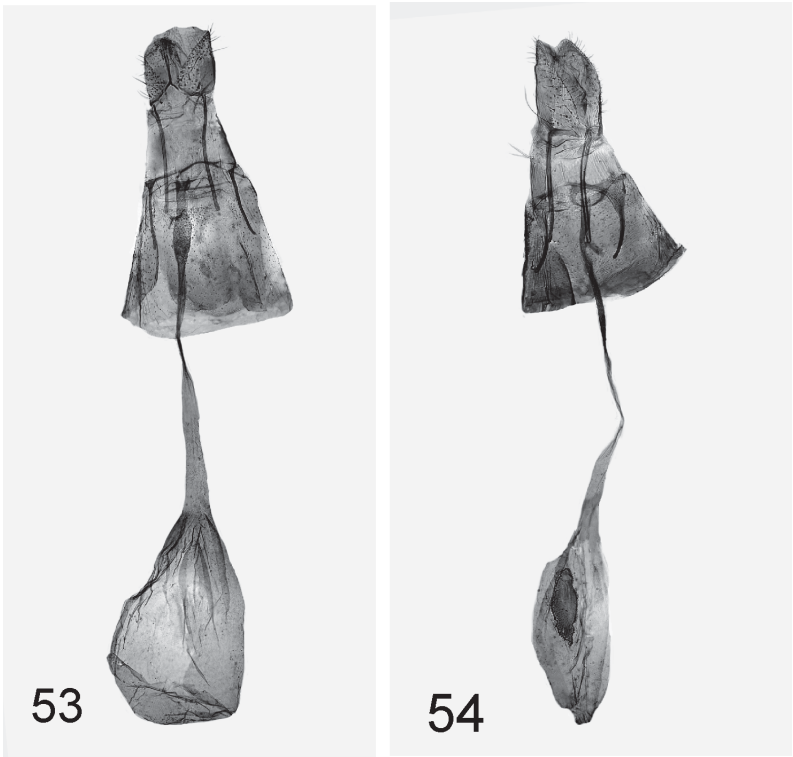
FIGURES 49–50. Female genitalia of *E. subula* Parenti. Fig. 49. Overview of the female genitalia (Russia: Tuva, Tannu-Ola mts.; L. Kaila prep. 6143). 50. Ostium bursae and colliculum enlarged.

Acknowledgements

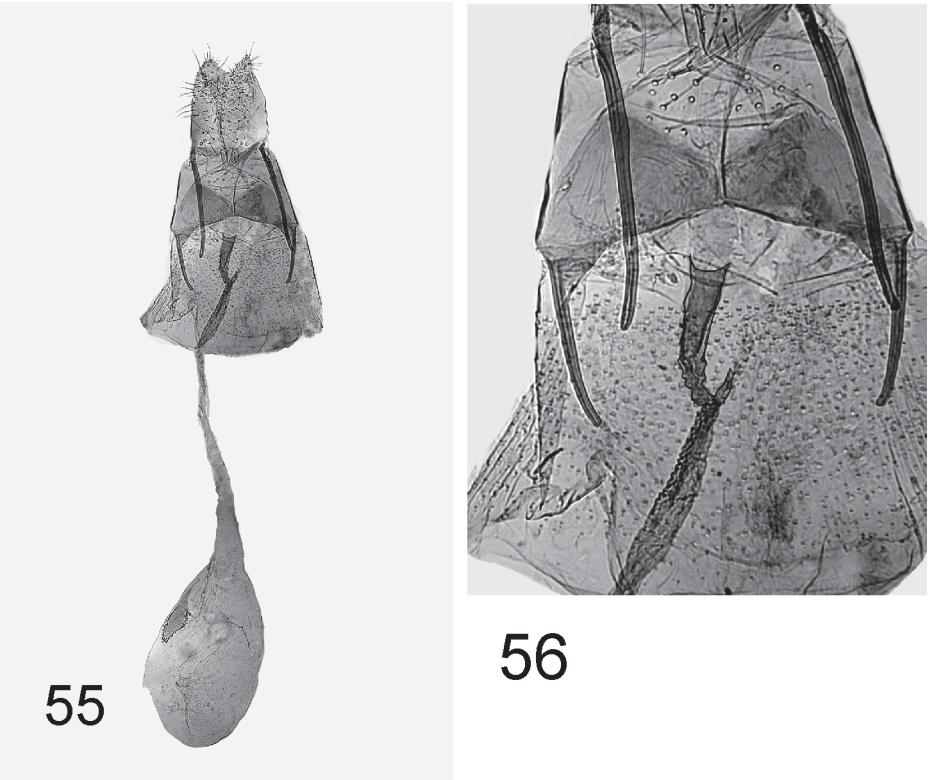
We would like to express our gratitude for the loan of material and/or valuable information to O. Bidzilya (Ukraine, Kiev), J. De Prins (Brussels, Belgium),V. Dubatolov (Russia, Novosibirsk), S. Gaal-Haszler (Austria, Wien), J. Junnilainen (Finland, Vantaa), T. Nupponen (Finland, Espoo), S. Sinev (Russia, St. Petersburg), R. Trusch (Germany, Karlsruhe), V. Sruoga (Vilnius, Lithuania) and Z. Tokár (Slovakia, Šaľa). P. Malinen prepared habitus photographs. J. Tabell donated his collection to MZH, and supplied invaluable information on the habitat and biology of *E. cisoria.* J. Stonis reinforced perseverance to LK to manage some of the less fascinating parts of manuscript preparation, very much appreciated.



FIGURES 51–52. Female genitalia of *E. cisoria* Kaila, **sp. nov.** 51. Overview of the female genitalia (Spain: Aragon, nr. Teruel; L. Kaila prep. 4705). 52. Ostium bursae and colliculum enlarged.



FIGURES 53–54. Female genitalia of *Elachista* spp. 53. *E. drepanella* Kaila, **sp. nov.** Overview (Kazakhstan: Barsuki Desert; L. Kaila prep. 6109). 54. *E. mus* Parenti. Overview (Kazakhstan: Terektikum Sands, N. Aralsk Town).



FIGURES 55–56. Female genitalia of *E. perona* Kaila, **sp. nov.** 55. Overview (Kazakhstan: Dzhambulskaya oblast; L. Kaila prep. 515). 56. Ostium bursae and colliculum enlarged.

References

Albrecht, A. & Kaila, L. (1997) Variation in wing venation in Elachistidae (Lepidoptera: Gelechioidea): methodology and implications to systematics. *Systematic Entomology*, 22, 185–198.
https://doi.org/10.1046/j.1365-3113.1997.d01-41.x

Kaila, L. (1992) The Elachistidae of southern Siberia and Central Asia, with descriptions of five new species (Lepidoptera). *Entomologica Fennica*, 3, 177–194.

Kaila, L. (1997) A revision of the Nearctic *Elachista* s. l. II. The *argentella* group (Lepidoptera, Elachistidae). *Acta Zoologica Fennica*, 206, 1–93.

Kaila, L. (1999) Phylogeny and classification of the Elachistidae s.s. (Lepidoptera: Gelechioidea). *Systematic Entomology*, 24, 139–169.
https://doi.org/10.1046/j.1365-3113.1999.00069.x

Kaila, L. (2007) A taxonomic revision of the *Elachista bedellella* (Sircom) complex (Lepidoptera: Elachistidae: Elachistinae). *Zootaxa*, 1629, 1–25.

Kaila, L. (2011a) Elachistine moths of Australia (Lepidoptera: Gelechioidea: Elachistidae). *Monographs on Australian Lepidoptera. Vol 11*. CSIRO Publishing, Melbourne, x + 443 pp.

Kaila, L. (2011b) A review of species related to *Elachista catalana* Parenti (Lepidoptera, Elachistidae: Elachistinae), with descriptions of two new species. *Entomologica Fennica*, 22, 85–96.

Kaila, L. (2011c) On species related to *Elachista pollutella* Duponchel (Lepidoptera, Elachistidae), with descriptions of four new Palaearctic species. *Entomologica Fennica*, 22, 129–139.

Kaila, L. (2012) On species related to *Elachista hedemanni* Rebel (Lepidoptera, Elachistidae: Elachistinae), with descriptions of three new Palearctic species. *Zootaxa*, 3316, 28–39.

Kaila, L. (2015a) The *Elachista dispunctella* (Duponchel) complex (Lepidoptera, Elachistidae) revisited, with exceptional level of synonymy. *Zootaxa*, 3980 (3), 301–358.
https://doi.org/10.11646/zootaxa.3980.3.1

Kaila, L. (2015b) New Palearctic species of the *Elachista bifasciella* group (Lepidoptera: Gelechioidea, Elachistidae), *SHILAP Revista de lepidopterologia*, 43 (171), 385–423.

Kaila, L. (2017) First records of Elachistinae from New Caledonia: evidence of repeated dispersal events with Australia (Lepidoptera, Gelechioidea, Elachistidae). *Zootaxa*, 4300 (4), 536–550.

DOI:/10.11646/zootaxa.4300.4.4
Kaila, L., Baran, T. & Mutanen, M. (2015) A revision of the *Elachista dispilella* complex (Lepidoptera: Gelechioidea: Elachistidae). *Zootaxa*, 3963 (4), 517–560.
https://doi.org/10.11646/zootaxa.3963.4.3
Kaila, L. & Nupponen, K. (2017) On species related to *Elachista deceptricula* Staudinger, 1880 with descriptions of three new species (Lepidoptera: Elachistidae. *SHILAP Revista de lepidopterologia*, 45 (179), 415–428.
Kaila, L., Nupponen, K., Junnilainen, J., Nupponen, T., Kaitila, J.-P. & Olschwang, V. (2003) Contribution to the fauna of Elachistidae (Lepidoptera) of the Southern Ural Mountains. *Entomologica Fennica*, 14, 65–90.
Kaila, L. & Sugisima, K. (2011) 1. Phylogeny, subfamily definition and generic classification. *In*: Kaila, L. (Ed.), Elachistine moths of Australia (Lepidoptera: Gelechioidea: Elachistidae). *Monographs on Australian Lepidoptera. Vol 11.* CSIRO Publishing, Melbourne, pp. 7–22.
Mutanen, M., Kaila, L. & Tabell, J. (2013) Wide-ranging barcoding aids discovery of one-third increase of species richness in presumably well-investigated moths. *Scientific Reports*, 3, 2901.
https://doi.org/10.1038/srep02901
Mutanen, M., Kekkonen, M., Prosser, S.W.J., Hebert, P.D.N. & Kaila, L. (2015) One species in eight: DNA barcodes from type specimens resolve a taxonomic quagmire. *Molecular Ecology Resources*, 15, 967–984.
https://doi.org/10.1111/1755-0998.12361
Parenti, U. (1981) Nuove specie di Elachistidi Paleartici (Lepidoptera, Elachistidae). I. *Bollettino del Museo di Zoologia dell'Università di Torino*, 4, 49–64.
Parenti, U. (1991) Elachistidae (Lepidoptera) from Mongolia. *Bollettino del Museo Regionale di Scienze Naturali, Torino*, 9, 209–215.
Sruoga, V., Sinev, S. Yu. & Rocienė, A. (2017) The Elachistidae (Lepidoptera: Gelechioidea) of Caucasus, with description of three new species. *Zootaxa*, 4338 (2), 241–262.
https://doi.org/10.11646/zootaxa.4338.2.2
Traugott-Olsen, E. (1988) The *Elachista triseriatella* Stainton complex, with descriptions of eight new species (Lepidoptera: Elachistidae). *Entomologist's Gazette*, 39, 293–312.
Traugott-Olsen E. (1990) The *Elachista dispilella* Zeller -complex, with description of ten new species (Lepidoptera: Elachistidae). *Entomologist's Gazette*, 41, 35–68.
Traugott-Olsen, E. (1992) The *Elachista dispunctella* (Duponchel, 1843) complex with descriptions of new taxa (Lepidoptera, Elachistidae). *SHILAP Revista de lepidopterologia*, 20, 197–316.
Traugott-Olsen, E. & Nielsen, E.S. (1977) The Elachistidae (Lepidoptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica*, 6, 1–299.